

DRAFT DATA REPORT

**HYLEBOS SEGMENTS 3 & 4 SUPPLEMENTAL DATA REPORT
PHASE I HYLEBOS MOUTH CLEANUP**

Prepared for

OCC Tacoma

709 Alexander Avenue

Tacoma, WA 98421

and

The Port of Tacoma

One Sitcum Plaza

Tacoma, WA 98424

Prepared by

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October 3, 2001



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ENVIRONMENTAL, L.L.C.

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1 INTRODUCTION

Anchor Environmental, LLC (Anchor) was retained by Occidental Chemical Corporation (Oxy) and the Port of Tacoma (Port) to better characterize sediment quality conditions within Segments 3 and 4 of the Hylebos Waterway in Tacoma, Washington. Though considerable historical data are available within this area of the waterway, and were previously used by the Hylebos Cleanup Committee (HCC), and the U.S. Environmental Protection Agency (EPA) to develop preliminary remediation plans (HCC 1999), additional data were needed to address specific remaining areas of uncertainty and to form a basis for prospective remedial design of both waterway and embankment areas. For the purpose of this data report, "embankments" are defined as nearshore cleanup areas between the shoreline (mean higher high water elevation) and either the toe of the existing slope or the waterway property line, whichever is encountered first.

The overall objectives for the data collection effort presented herein can be generally summarized as follows:

- Determine how embankment remediation can be most appropriately integrated into the overall remediation plan for Segments 3 and 4
- Verify whether natural recovery areas located within the main channel and adjacent berthing areas will achieve cleanup standards without active remediation
- Refine and/or confirm the depth of contamination in prospective dredging areas, in order to reduce uncertainties in the total dredge volume of Segments 3 and 4
- Identify the potential extent of habitat loss and assess whether mitigation would be required
- Determine whether disposal of contaminated dredge material from Segments 3 and 4 has the potential to pose water quality concerns at the Blair Slip 1 nearshore confined disposal site. To this end, a composite sediment sample from the prospective dredge prism was analyzed using thin-layer column leach testing (TCLT) procedures. *(Note that at the time of writing of this Draft Data Report, TCLT testing is still ongoing; these data will be presented as part of the final Segment 3 and 4 Data Report.)*

A draft Work Plan/Sampling and Analysis Plan (WP/SAP) describing the work presented herein was initially prepared and submitted to EPA and its consultants for review (Anchor 2001).

EPA's comments on the draft WP/SAP were provided verbally in meetings held on June 14,

June 20, and June 27, 2001. EPA's requested changes to the draft WP/SAP, including collection of additional samples in specific areas of the waterway, were incorporated into the WP/SAP prior to initiating sample collection.

With the exception of tributyltin (TBT) analysis, all sampling and analysis methods used in this investigation were consistent with those used by the HCC, as previously approved by EPA (HCC 1999). However, the TBT analysis method utilized in the HCC investigation was based on an earlier Puget Sound Estuary Program (PSEP) protocol, which has since been substantively revised. Specifically, the earlier TBT method included filtering of sediment porewater prior to TBT derivitization. As set forth in the current PSEP protocol (PSEP 1997) including the Sediment Annual Review Meeting (SMARM) clarification paper update (Hoffman 1998), filtering of sediment porewater is no longer considered appropriate for TBT analyses; the current protocol utilizes a centrifuge process prior to TBT derivitization. All TBT analyses presented herein were performed using the current PSEP protocol for TBT.

This report addresses all data collected, with the exception of TCLT data. When the TCLT tests are completed (spring of 2002), these data will be incorporated into the final data report.

Sampling station locations are depicted in Figure 1. Marine Sampling Systems (MSS) provided the sampling platform, and along with Anchor staff, collected sediment cores during field activities. Anchor processed the sediment cores at the Rosa Environmental and Geotechnical (REG) laboratory facility located in Seattle, Washington. Analytical Resources, Inc. (ARI), located in Seattle, Washington, conducted the chemical analyses for the sediment samples.

This document summarizes the procedures followed and identifies deviations from the WP/SAP. Sediment chemistry results are presented and compared with the Commencement Bay Sediment Quality Objectives (CB/SQOs). The SQO for PCBs is 300 micrograms per kilogram (ug/kg; dry weight basis), as set forth in EPA's 1997 Explanation of Significant Differences (ESD) and in the PRDE Report (HCC 1999). The SQO for TBT is 0.7 ug/L (interstitial porewater basis), as set forth in a letter to the HCC dated May 16, 1996 (EPA 1996) and in the PRDE Report (HCC 1999), and recently confirmed through discussions with EPA (P. Contreras, personal communication, October 3, 2001).

2 REPORT ORGANIZATION

This report presents the results of the sampling and analysis program as described in the project WP/SAP (Anchor 2001). This report is organized as follows:

- Section 1 – Introduction
- Section 2 – Report Organization
- Section 3 – Sampling Location Rationale
- Section 4 – Sampling Vessel and Location Control
- Section 5 – Surface Sediment Sampling Effort
- Section 6 – Subsurface Sediment Sampling Effort
- Section 7 – Sediment Chemical/Physical Analyses
- Section 8 – Thin Layer Column Leachate Test
- Section 9 – Discussion
- Section 10 – References

Figures and Tables compiling and illustrating the data are presented at the end of this document.

Appendices provide supporting project documentation and are organized as follows:

- Appendix A – Work Plan/Sampling and Analysis Plan
- Appendix B – Surface Sediment Collection Logs
- Appendix C – Subsurface Sediment Collection Logs
- Appendix D – Sediment Chemistry Data Validation Report
- Appendix E – TCLT Laboratory Report – Pending
- Appendix F – TCLT Chemistry Data Validation Report - Pending

3 SAMPLING LOCATION RATIONALE

This section addresses the rationale used in selecting locations for the surface and subsurface sediment sampling effort identified in the WP/SAP (Anchor 2001). The WP/SAP is located in Appendix A of this document. Surface and subsurface sampling locations were identified in the WP/SAP (Appendix A; Figure 1), and their objectives are identified below:

- 16 surface sediment samples were collected in the vicinity of the Taylor Way Properties area to address how embankment remediation in this area could be most appropriately integrated into the overall remediation plan for Segments 3 and 4
- 10 surface sediment samples and 4 subsurface sediment cores were collected within SMAs 301, 302, and 401 to help determine whether natural recovery areas located within these main channel and adjacent berthing areas would in fact achieve cleanup standards without active remediation
- 6 subsurface sediment cores were collected within prospective dredge areas to help refine and/or confirm the depth of contamination within these areas in order to reduce uncertainties in the total dredge volume of Segments 3 and 4
- 10 surface sediment samples and 6 subsurface sediment cores were collected within the main channel areas to better define surface and subsurface chemical concentrations where sufficient historical data were lacking
- 8 subsurface sediment cores were collected for TCLT testing to help determine whether disposal of contaminated dredge material from Segments 3 and 4 would have the potential to pose water quality concerns at the Blair Slip 1 disposal site

4 SAMPLING VESSEL AND LOCATION CONTROL

Surface and subsurface sediment sample collection were conducted off of the research vessel, *R/V Nancy Anne*, operated under the direction of Mr. Bill Jaworski, owner of MSS. The *R/V Nancy Anne* is an aluminum, flat deck, 36-foot long, 14-foot wide catamaran vessel with twin 120-horsepower engines, and a draft ranging from 18 inches at the bow to 24 inches at the stern. The vessel is equipped with a 14-foot high hydraulically operated A-frame with boom, a variable speed winch (3,000 pound capacity with speeds of 1 to 3 feet per second), and 270 square feet of deck space. The vessel is also equipped with a pilot house, seawater pumps, differential global positioning system (DGPS), and a depth sounder.

Horizontal positioning at each sampling location was determined using an on-board Trimble DGPS with a Northstar GPS unit as backup when necessary. Station positions were reported in latitudinal and longitudinal coordinates (North American Datum [NAD] 83) to the nearest 0.1 second. The accuracy of the horizontal coordinate system is within 3 meters. Vertical elevation of each sampling station was measured using a fathometer or lead line and converted to mean lower low water (MLLW). Tidal elevations were determined using measured data from the National Oceanographic and Atmospheric Administration's (NOAA's) automated tide gage located in Commencement Bay, Tacoma, Washington.



5 SURFACE SEDIMENT SAMPLING EFFORT

This section provides summaries of the sample collection procedures, sample processing procedures, field quality assurance samples collected, and any deviations from the sampling plan associated with the surface sediment samples. Anchor personnel coordinated all surface sediment sample collection activities.

Sample containers, instruments, working surfaces, technician protective gear, and other items with the potential of coming into contact with the surface sediment sample material must meet high standards of cleanliness. All equipment and instruments in contact with the sediments were made of glass, stainless steel, or polytetrafluoroethylene (PTFE), and were cleaned prior to each day's use and between sampling or compositing events. Decontamination of all items followed PSEP protocols. The decontamination procedure follows:

- Pre-wash rinse with tap water
- Wash with solution of tap water and Alconox soap
- Rinse with tap water
- Rinse three times with distilled water
- Cover (no contact) all decontaminated items with aluminum foil
- Store in clean, closed container for next use if possible

The analytical lab provided certified, pre-cleaned, EPA-approved containers for all samples. Prior to shipping, the analytical laboratory added preservatives to the sample containers, where required, according to PSEP protocols.

Table 2 of the WP/SAP (Appendix A) lists the containers, preservation techniques, and holding times for conventional, organic, and inorganic compounds necessary to meet the requirements specified in PSEP protocols (PSEP 1997).

5.1 Summary of Sample Collection and Processing Procedures

Surface sediment samples from the 0 to 10-cm biologically active zone were collected for chemical and physical testing using a van Veen grab sampler in accordance with PSEP protocols (PSEP 1997). The sampler is patented and operated by MSS under the direction of Mr. Bill Jaworski and has been effective in improving sediment penetration recovery. The sampler utilizes a modified hydraulic hinged jaw assembly for sample collection. Upon

contact with sediments, the jaws are drawn shut to collect the sample. The sampler is used to collect large volume, surficial sediment samples. Samples were collected in the following manner in accordance with PSEP protocols:

- Vessel was maneuvered to proposed location
- Jaw assembly was decontaminated
- Jaw assembly was deployed
- The cable to the jaw assembly was drawn in taut and perpendicular
- Location of the cable hoist was measured and recorded by the location control personnel
- The jaw assembly was drawn shut to collect the sediment sample to a penetration depth of approximately 15-cm for a 0 to 10-cm grab
- The sediment sample was retrieved aboard the vessel and evaluated against the following PSEP acceptability criteria:
 - van Veen sampler is not overfilled (i.e., sediment surface against top of sampler)
 - Sediment surface is relatively flat, indicating minimal disturbance or winnowing
 - Overlying water is present, indicating minimal leakage
 - Overlying water has low turbidity, indicating minimal sample disturbance
 - Desired penetration depth is achieved
- Overlying water was siphoned off and a stainless steel trowel or similar device was used to collect only the desired sediment fraction from inside the van Veen sampler, taking care not to collect sediment in contact with the sides/surface of the sampler
- The desired sediment fraction from the inside of the van Veen sampler was placed in a stainless steel container. When sufficient sample volume had been collected, the sediment was homogenized using a stainless steel spoon
- Homogenized sediment was placed immediately into appropriate pre-labeled sample containers (certified, pre-cleaned) and placed immediately on ice for transport to the appropriate laboratory

5.2 Field Quality Assurance Samples

Field quality assurance samples were collected to assess potential problems as a result of sample processing in the field. One equipment rinsate blank and one field blank were submitted to the laboratory for analysis. The purpose of the equipment rinsate and field blanks was to assess the degree to which a parameter of interest was added or removed

during field operations such as equipment decontamination procedures. The rinsate blank was prepared by pouring distilled water over the decontaminated sampling and compositing equipment into a pre-preserved sample jar. The field blank was collected by pouring distilled water directly from its container into a pre-preserved sample jar. The rinsate and field blanks were analyzed for metals, semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs). No compounds or analytes were detected in the equipment rinsate or field blanks (see Table 1.)

5.3 Deviations from the Sampling Plan

All surface sediment samples were successfully collected, with the exception of Station T17A-8, where sampling was not performed. Station T17A-8 was located under a large log raft for the duration of the sampling activities. However, because elevated PCB concentration were detected at an adjacent sediment sampling location (T17A-7), this deviation did not substantively affect the characterization of prospective cleanup boundaries (see below).

All surface sediment samples were collected at their target locations indicated in the SAP, except for the surface sediment grab collected at Station T16A-1. There were large log rafts tied up in the area that precluded sample collection at the originally intended location. Therefore, Station T16A-1 was relocated 21.3 feet away from the target location. However, this deviation did not affect the characterization of the areal extent of contamination in this area.

6 SUBSURFACE SEDIMENT SAMPLING EFFORT

This section provides summaries of the sample collection procedures, sample processing procedures, field quality assurance samples collected, and any deviations from the sampling plan associated with the subsurface sediment samples. Anchor personnel coordinated all subsurface sediment sample collection activities.

Sample containers, instruments, working surfaces, technician protective gear, and other items with the potential of coming into contact with the surface sediment sample material must meet high standards of cleanliness. All equipment and instruments in contact with the sediments were made of glass, stainless steel, or PTFE, and were cleaned prior to each day's use and between sampling or compositing events. Decontamination of all items followed PSEP protocols. The decontamination procedure follows:

- Pre-wash rinse with tap water
- Wash with solution of tap water and Alconox soap
- Rinse with tap water
- Rinse three times with distilled water
- Cover (no contact) all decontaminated items with aluminum foil
- Store in clean, closed container for next use if possible

The following procedure was used to decontaminate sediment boring tubes prior to use:

- Rinse and pre-clean with potable water
- Wash and scrub the tubes in a solution of laboratory grade non-phosphate based soap and potable water
- Rinse with potable water
- Rinse three times with distilled water
- Seal both ends of each core tube with aluminum foil

The analytical lab provided certified, pre-cleaned, EPA-approved containers for all samples. Prior to shipping, the analytical laboratory added preservatives to the sample containers, where required, according to PSEP protocols.

Table 2 of the WP/SAP (Appendix A) lists the containers, preservation techniques, and holding times for conventional, organic, and inorganic compounds necessary to meet the requirements specified in PSEP protocols (PSEP 1997).

6.1 Summary of Sample Collection

Sediment boring samples were collected using a vibracorer. The vibracorer unit consists of two contra-rotating electric motors encased in aluminum housing. An electric generator on the vessel via a submersible tether cable powers the vibracorer. When energized, the motors produce a high-frequency vibration capable of penetrating most unconsolidated strata.

The vibracorer was deployed from the bow of the vessel using an A-frame and winch assembly. A 3.75-inch inside diameter decontaminated aluminum pipe was cut to the appropriate length based on the sampling depth at each location and clamped to the vibracorer. The vibracorer was deployed over the bow and sent to the bottom, where the unit was then energized and lowered to the appropriate depth. When the target depth was reached, the vibracorer was turned off and returned to the surface for sample processing. During the coring operation, the penetration of the core pipe was continuously monitored. The core was then capped and stored on ice for transport to the sectioning and compositing site (REG).

The elevation of each boring station was measured. This was accomplished using a fathometer or lead line to determine the depth at the sampling location. Tidal elevation at each sampling location was corrected to MLLW using tide data obtained from the Commencement Bay NOAA gaging station. When possible, each boring was driven just past the deepest historical dredge depth at each location.

The core tube caps were removed immediately prior to placement into the coring device. Care was taken during sampling to avoid contact of the sample tube with potentially contaminated surfaces. Extra sample tubes were available during sample operations for uninterrupted sampling in the event of a potential core tube breakage or contamination. Core tubes suspected of having been accidentally contaminated were not used. Logs and field notes of all core samples were maintained as samples were collected and correlated to the sampling location map. The following information was included in this log:

- Names of field supervisor and person(s) collecting and logging in the sample
- Location of each boring station as determined by DGPS
- Date and time of collection
- Elevation of each boring station sampled as measured from MLLW
- Observations made during sample collection including: weather conditions, complications, ship traffic, and other details associated with the sampling effort
- The sample station number as derived from Figure 1 and Table 3 of the WP/SAP (Appendix A)
- Length and depth intervals of each core section and recovery for each sediment boring as measured from MLLW
- Qualitative notation of apparent resistance of sediment column to coring
- Any deviation from the approved sampling plan

During deployment and retrieval of the coring device, care was taken to ensure that the end of the core tube did not become contaminated. Core tubes longer than 3-feet were cut in half to facilitate upright storage, with the exception of core tubes collected for TCLT. For TCLT cores, core tubes were cut into 2-foot sections and were processed separately as described in Section 7.1. The cut tubes were individually labeled. Core orientation was marked on each tube. Labels identifying the core section were securely attached to the outside of the casing and wrapped with transparent tape to prevent loss or damage of the label. The core sections were stored upright in iced containers until they were processed at REG.

6.2 Summary of Sample Processing

All working surfaces and instruments were thoroughly cleaned, decontaminated, and covered with aluminum foil to minimize outside contamination between processing samples. Disposable gloves were discarded after processing each station and replaced prior to handling decontaminated instruments or work surfaces.

Each core section was documented as discussed below. A sediment description of each core sample was recorded on the core log for the following parameters as appropriate and present:

- Sample recovery (depth in feet of penetration and sample compaction)
- Physical soil description in accordance with the Unified Soil Classification System (includes soil type, density/consistency of soil, color)
- Odor (e.g., hydrogen sulfide, petroleum, etc.)
- Vegetation
- Debris
- Biological activity (e.g., detritus, shells, tubes, bioturbation, live or dead organisms)
- Presence of oil sheen
- Any other distinguishing characteristics or features

After the physical characteristics of each core were documented, the native layer of each core was identified, if clearly present. The number of samples submitted for chemical analyses depended on the depth of the native layer. For cores where the native layer was located within the top 4 feet of sediment, a 2-foot section of the core was collected approximately 6-inches below the top of the native layer for chemical analyses. The purpose of these samples was to characterize chemical constituents below the apparent native layer. For cores where the native layer was located below the top 4 feet of sediment, the core was processed in 2-foot intervals below the surface, extending to a depth of 2 feet below the native layer interface. For instance, if the native layer was identified at a depth of 8 feet below mudline, four discrete sediment samples were collected at the following intervals: 2 to 4 feet, 4 to 6 feet, 6 to 8 feet, and 8 to 10 feet. Anchor worked with OCCT and the Port to determine which of these samples were submitted for chemical analysis, and which were to be archived for possible subsequent analysis.

6.3 Field Quality Assurance Samples

Field quality assurance samples were collected to assess potential problems as a result of sample processing in the field. One equipment rinsate blank and one field blank were submitted to the laboratory for analysis. The purpose of the equipment rinsate and field blanks was to assess the degree to which a parameter of interest was added or removed during field operations such as equipment decontamination procedures. The rinsate blank was prepared by pouring distilled water over the decontaminated sampling and compositing equipment into appropriate sample jars. The field blank was collected by pouring distilled water directly from its container into appropriate sample jars. The rinsate

and field blanks were analyzed for metals, semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs). No compounds or analytes were detected in the equipment rinsate or field blanks (See Table 1).

6.4 Deviations from the Sampling Plan

Sample collection and processing procedures for the subsurface sediment samples did not deviate from the sampling plan (Anchor 2001).

7 SEDIMENT CHEMICAL/PHYSICAL ANALYSES

Thirty-seven (37) surface sediment and 16 sediment borings were collected during the week of July 9, 2001. The sediment borings were processed into a total of 30 individual subsurface sediment sample intervals. All surface and subsurface sediment samples were submitted to the analytical laboratory for analysis or archival. Eleven (11) subsurface sample intervals were archived for possible future analysis. The surface sediment and subsurface sediment samples were submitted to the laboratory with their own set of equipment rinsate blanks and field blanks, for a total of two rinsate blanks and two field blanks for the entire project. All samples were submitted to ARI of Seattle, Washington, for chemical testing. The validated chemistry data are provided in Table 1.

7.1 Methods

All sediment samples were analyzed in accordance with the methods outlined in the WP/SAP.

7.2 Deviations from the Sampling Plan

Based on initial sample results, archived surface sediment material was resubmitted to the laboratory for porewater extraction and tributyltin (TBT) analysis (largely due to elevated TBT concentrations detected at Station T23A-5). However, these archive samples were not analyzed within the recommended holding time of 7 days for TBT porewater extraction. Thus, the results from the archive sample TBT analyses are qualified (see below).

The original TBT results, along with the archived results are provided in Table 2. Two of the original TBT samples (i.e., analyzed within holding times) were also reanalyzed with the archive (beyond holding time) samples as a check on possible bias resulting from extended holding times. The range in reported concentration ratios between the original and archive TBT analyses of these two samples was used to develop a range of TBT concentrations that were likely present in the original sample, accounting for possible loss of TBT during extended holding times. This estimation approach appropriately compounded the uncertainty of such TBT determinations. However, since none of the projected upper bound TBT concentrations exceeded the CB/SQO for TBT ion in the archive samples (Table 2), this deviation did not substantively affect the determination of cleanup boundaries.

7.3 Data Quality Assessment

The overall data quality objectives for collection and chemical testing of sediment samples were met, as set forth in the WP/SAP, with the exception of antimony results reported as non-detected values. Matrix interferences were associated with the antimony analyses and due to the low recoveries of the matrix spikes all antimony results reported as non-detected values were rejected. All other data for this project are considered acceptable for use as qualified. The data validation report is presented in Appendix D of this report.

8 THIN LAYER COLUMN LEACHATE TEST – PENDING COMPLETION OF TCLT

8.1 Sediment Collection and Processing

Sediment boring samples for TCLT were collected in the same manner as the sediment borings for chemical/physical analyses, with the following exceptions:

- Sediment cores were cut into 2-foot sections
- Sediment cores were extruded at REG in a nitrogen chamber (oxygen-free atmosphere)

To ensure container conditions remained anoxic, sample collection protocols included capping, taping, and continuous icing of the core segments until delivery to REG.

Anoxic extrusion and processing of core samples followed standard REG procedures.

8.2 Groundwater Collection

To estimate the potential leachate quality from the Slip 1 nearshore confined disposal facility, site groundwater was used as the leach water in the TCLT. Groundwater was collected in accordance with the Event 1C Sampling and Analysis Plan (SAP) Addendum (SEA et al. 1996). Site groundwater was obtained from groundwater well HCC-1 located adjacent to Slip 1 in the Blair Waterway.

8.3 Methods – Pending

8.4 Data Quality Assessment – Pending

8.5 Results - Pending

9 DISCUSSION

As set forth in the WP/SAP, screening-level benchmarks of sediment quality used for this sediment characterization were based on the Commencement Bay Sediment Quality Objectives (CB/SQOs). As discussed above, the applicable SQO for PCBs is 300 ug/kg (dry weight basis), and the applicable SQO for TBT is 0.7 ug/L (interstitial porewater basis), as set forth in the PRDE Report (HCC 1999) and supporting EPA documentation. Chemistry data along with the CB/SQO chemical criteria are provided in Table 1 (see Table 2 for TBT determinations). Chemical analytes/compounds that exceed the CB/SQO chemical criteria are also identified in Tables 1 and 2.

As discussed above, considerable historical data are available for Segments 3 and 4 of the Hylebos Waterway, and were previously used by HCC and EPA to develop preliminary remediation plans (HCC 1999). Incorporating the Table 1 and 2 data will likely result in modifications to these cleanup plans. A preliminary analysis of pending changes to these remediation plans is provided in Figure 1, and is summarized by Sediment Management Area (SMA) below:

- **Tacoma Public Utilities (TPU) Natural Recovery Area (SMA 402).** The preliminary remediation plan for SMA 402 was natural recovery of an approximate 0.2-acre intertidal embankment area (HCC 1999). Although slightly elevated (above CB/SQOs) polynuclear aromatic hydrocarbon (PAH) concentrations were detected during this study in the adjoining offshore channel area (Station AN-4102), lower PAH concentrations (well below CB/SQOs) were detected at adjacent sediment sampling locations. Similarly low PAH concentrations were also detected at Station 4102 during the HCC's 1996 sampling. A preliminary statistical analysis of the available data suggests that the 95th percentile upper confidence limit of the mean concentration of all recent samples collected within the immediate vicinity of Station AN-4102 is well below the CB/SQO criteria. Thus, no action within the offshore channel area is indicated. Accordingly, the prospective SMA 402 natural recovery area was not changed from that presented in the PRDE Report (HCC 1999).
- **Taylor Way Embankment (SMA 431).** Elevated PCB, metal, and PAH concentrations were detected in surface and subsurface sediments within this embankment area, consistent with HCC (1999). Active remediation is required in this area. As generally

described in the PRDE Report (HCC 1999), an embankment cap may be a suitable cleanup remedy for this area. Such a cap could potentially be designed for SMA 431 to avoid or minimize adverse impacts to aquatic habitat.

- **Taylor Way Waterway Area (SMA 421).** Surface concentrations of PCBs and other chemicals previously detected in this area were lower in this channel area during the most recent sampling, consistent with natural recovery processes. A preliminary dredging plan for this area, using assumptions consistent with those used in the previous HCC (1999) plans, is summarized in Figure 1, and represents a prospective removal volume from this open-water channel area of approximately 37,000 cubic yards (cy).
- **Sound Refining Embankment (SMA 432).** No sampling of SMA 432 was performed for this study. However, samples collected in the adjoining offshore area were below CB/SQO criteria, indicating that remedial actions in this embankment area are clearly divisible from open-water actions.
- **Shoaling Area S44 (Station 3101).** No surface sediment sampling of Shoaling Area S44 was performed for this study. However, samples collected in the adjoining offshore area were below CB/SQO criteria.
- **Simons Natural Recovery Area (SMAs 401 and 441).** Consistent with results from SMA 421, surface concentrations of PCBs and other chemicals previously detected in this area were lower in the channel SMA during the most recent sampling, consistent with natural recovery processes. However, elevated concentrations of bis(2-ethylhexyl)phthalate were detected in the nearshore area, consistent with previous detections of this chemical at higher concentrations within the Simons embankment. Since the embankment area was recently remediated (providing effective source control), and consistent with the previous HCC (1999) plan, the prospective remedy for this SMA is natural recovery, as summarized in Figure 1.
- **Buffalen Embankment (SMA 341).** No sampling of SMA 341 was performed for this study. However, samples collected in the adjoining offshore area were below CB/SQO

criteria, indicating that remedial actions in this embankment area are clearly divisible from open-water actions.

- **Buffalen Channel Area (SMA 321).** Elevated chemical concentrations are still present in this area above CB/SQOs. Consistent with the previous HCC (1999) plan, the prospective remedy for this SMA is dredging of approximately 2,000 cy, likely contiguous with removal of the adjacent SMAs 301 and 322+, as summarized in Figure 1.
- **Buffalen/Murray-Pacific Natural Recovery Area (SMA 301).** Elevated TBT (unqualified data) concentrations were detected in surface sediments in this SMA (Station T23A-5) above prospective natural recovery action levels. A preliminary dredging plan for this area, using assumptions consistent with those used in the previous HCC (1999) plans, is summarized in Figure 1, and represents a prospective removal volume from this open-water channel area of approximately 12,000 cy.
- **Murray-Pacific Channel Area (SMA 322+).** No sampling of SMA 322 was performed for this study because a significant amount of data had been collected previously (Anchor 2000). The prospective dredge plan for this area, summarized in Figure 1, is consistent with the previous HCC (1999) plans, and also incorporates the results of recent PSDDA sampling of the adjoining embankment. The prospective removal volumes from open-water and slope areas in this SMA are approximately 48,000 cy and 33,000 cy, respectively.

More definitive remediation planning would occur during remedial design, following completion of the TCLT.

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TABLES



Chemical	Concentration Bay SGO	Sample ID	AN-HY-14 (0.0 to 0.3 ft)	T14A-3 (0.0 to 0.3 ft)	T15A-1 (0.0 to 0.3 ft)	T15A-3 (0.0 to 0.3 ft)	T15A-4 (0.0 to 0.3 ft)	T16A-1 (0.0 to 0.3 ft)	T16A-5 (0.0 to 0.3 ft)	T16A-6 (0.0 to 0.3 ft)
Elevations in MLW			-30.5 feet	-35.1 feet	-18.4 feet	-9.0 feet	-2.7 feet	-34.9 feet	-23.5 feet	-11.6 feet
Physical Parameters										
Total solids (%)			65.1	58.7	54.2	57.5	72.3	65.6	51.1	64.6
Gravel (%)			15.4	6.48	2.5	6.9	4.5	17.6	5.1	5.7
Sand (%)			49.9	44.0	45.8	72.9	86.8	52.4	47.2	72.5
Silt (%)			23.6	35.0	31.6	12.1	6.4	20.0	26.4	14.5
Clay			11.1	20.5	20.0	8.1	2.3	10.0	19.3	7.3
Total organic carbon (%)			2.3	2.1	2.9	4.2	2.40	2.4	2.9	2.2
Metals (mg/kg)										
Antimony	150		7 R	8 R	9 R	9 R	6 R	7 R	9 R	8 R
Arsenic	57		33	15	20	16	6 U	25	16	29
Cadmium	5.1		0.3 U	0.3 U	0.4 U	0.4	0.3 U	0.3 U	0.4 U	0.3
Copper	390		79	60.1	65.1	39.3	19.5	56.9	88.1	74
Lead	430		38	32	42	28	14	25	55	49
Mercury	0.59		0.16	0.16	0.18	0.08	0.08	0.14	0.24	0.15
Nickel	140		15	16	15	12.0	10.0	14	20	15.0
Silver	6.1		0.5	0.6	0.6	0.5	0.4 U	0.5	0.6 U	0.5
Zinc	410		89.1	71.1	81	59	46	70.1	105	108
Organometallic Compounds (ug TBT ion/L)										
Tributyltin (interstitial water)	0.70		NA	NA	NA	NA	NA	NA	NA	NA
Organics (ug/kg)										
Total LPAH ^{(1) (2)}	5,200		33	160	1,138	1,757	435	275	1,173	634
Naphthalene	2,100		19 U	19 U	20	38	19 U	24	23	23
Acenaphthylene	1,300		19 U	19 U	60	50	19 U	24	38	18
Acenaphthene	500		19 U	19 U	60	110	38	17 J	88	49
Fluorene	540		19 U	19 U	68	110	27	21	84	44
Phenanthrene	1,500		33	100	720	1,100	220	120	720	380
Anthracene	960		19 U	60	210	340	150	59	220	120
2-Methylnaphthalene	670		19 U	19 U	20	51	19 U	12 J	21	19
Total HPAH ⁽²⁾	17,000		607	1,296	6,208	8,877	2,068	2,319	4,767	3,014
Fluoranthene	2,500		77	200	1,500	2,500	630	280	1,300	480
Pyrene	3,300		110	150	1,100	2,200	390	350	780 J	560
Benz(a)anthracene	1,600		43	100	480	870	190	160	400 J	250
Chrysene	2,800		75	200	710	930	340	300	590 J	410
Benzo(b)fluoranthene	-		81	190	590	860 J	130	350	450 J	380
Benzo(k)fluoranthene	-		85	130	460	550 J	140	280	360 J	260
Benzo(a)fluoranthene (b+k) ⁽³⁾	3,500		146	320	1,050	1,410 J	270	630	810 J	640
Benzo(a)pyrene	1,600		60	110	520	570 J	110	240	410 J	270
Indeno(1,2,3-c,d)pyrene	690		48	83	440	320 J	85	180	250 J	200
Dibenz(a,h)anthracene	230		19 U	20	78	47 J	19 U	39	47 J	4
Benzo(g,h,i)perylene	720		48	73	330	230 J	54	140	180 J	160
Halogenated Hydrocarbons (ug/kg)										
1,3-Dichlorobenzene	170		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
1,4-Dichlorobenzene	110		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
1,2-Dichlorobenzene	50		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
1,2,4-Trichlorobenzene	22		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Hexachlorobenzene (HCB)	22		1.8	0.88 U	3.4	1.4	0.88 U	2.0	3.1	1.0
Phthalates (ug/kg)										
Dimethyl phthalate	160		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Diethyl phthalate	200		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Di-n-butyl phthalate	1,400		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Butyl benzyl phthalate	900		19 U	19 U	15 J	30	19 U	19 U	19 U	19
Bis(2-ethylhexyl) phthalate	1,300		51	92	150	86	23	95	140 J	100
Di-n-octyl phthalate	6,200		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Phenols (ug/kg)										
Phenol	420		19 U	19 U	19 U	19 U	19 U	19 U	63	19
2-Methylphenol	63		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
4-Methylphenol	670		19 U	19 U	19 U	21	19 U	19 U	19 U	19
2,4-Dimethylphenol	29		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Pentachlorophenol	360		96 U	95 U	95 U	97 U	95 U	93 U	97 U	94
Miscellaneous Extractables (ug/kg)										
Benzyl alcohol	73		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Benzoic acid	650		190 U	190 U	190 U	110 J	190 U	190 U	190 U	190
Dibenzofuran	540		19 U	19 U	21	54	19 U	16 J	34	16
Hexachlorobutadiene	13		1.7 Y	0.88 U	3.0	0.97 U	0.88 U	1.5	2.8	1.3
N-Nitrosodiphenylamine	26		19 U	19 U	19 U	19 U	19 U	19 U	19 U	19
Pesticides (ug/kg)										
DDE	9.0		1.8 Y	1.8 U	2.6	1.9 U	1.8 U	1.8 U	3.1	2.6
DDD	18.0		1.8 Y	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	1.9 U	2.0
DDT	34.0		2.6 U	1.8 U	1.8 U	2.1 Y	1.8 U	1.8 U	12 Y	3.8
PCBs (ug/kg)										
Aroclor 1016			18 U	18 U	18 U	19 U	18 U	18 U	19 U	19 U
Aroclor 1242			18 U	18 U	18 U	19 U	18 U	18 U	19 U	19 U
Aroclor 1248			18 Y	21 Y	37 Y	19 U	18 U	18 U	40 Y	19 U
Aroclor 1254			34 Y	23 Y	42	19 U	18 U	22 Y	89 Y	23 Y
Aroclor 1260			220	39	160	90	26	38	970	170
Aroclor 1221			36 U	36 U	36 U	39 U	35 U	37 U	37 U	43 U
Aroclor 1232			18 U	29 Y	36 Y	19 U	18 U	18 U	31 Y	19 U
Total PCBs (ug/kg)	300		220	39	222	90	26	38	970	170

J - Estimate

R - Result is rejected. See validation report for reasons for rejection.

U - Undetected at the detection limit shown.

Y - Indicates raised reporting limit due to interference.

NA - Not analyzed.

(1) 2-Methylnaphthalene is not included in the total LPAH calculation.

(2) Total LPAHs and HPAHs are the sum of all detected contaminants within the subheading. When all isomers were not detected, the

Qualifiers were attached to the Total LPAHs or HPAHs value if any of the contributing concentrations were denoted with that qualifier.

Part 1
Dry Weight Measurements

T16A-6A (0.3 to 2.3 ft)	T16A-6B (2.3 to 4.3 ft)	T16A-7 (0.0 to 0.3 ft)	T16A-8 (0.0 to 0.3 ft)	T17A-5 (0.0 to 0.3 ft)	T17A-6 (0.0 to 0.3 ft)	T17A-6A (0.3 to 2.3 ft)	T17A-6B (2.5 to 4.5 ft)	T17A-7 (0.0 to 0.3 ft)	T18A-3 (0.0 to 0.3 ft)	T18A-4 (0.0 to 0.3 ft)	T18A-4A (0.3 to 2.3 ft)	T18A-4B (2.3 to 4.3 ft)
-13.4 feet	-13.4 feet	-0.2 feet	+3.4 feet	-21.1 feet	-19.5 feet	-6.7 feet	-6.7 feet	-8.9 feet	-21.0 feet	-14.0 feet	-16.2 feet	-16.2 feet
59.5	40.3	78.6	84	54.4	57.1	61	37.6	63.6	43.6	50.0	37.5	36.6
5.8	4.0	2.3	2.6	3.0	6.5	1.2	9.9	7.7	2.6	1.1	7.6	7.0
61.6	21.2	96.6	96.0	46.0	60.4	31.9	52.1	77.0	28.8	45.6	23.0	29.8
21.8	45.3	1.1	1.4	29.6	19.7	40.2	23.2	8.7	48.3	32.9	39.3	36.3
10.6	29.5	0.0	0.0	21.4	13.5	26.7	14.8	6.6	20.3	20.4	30.1	24.9
5.2	7.0	0.2	0.3	2.9	2.70	2.1	8.9	3	4.0	3.4	5.2	8.1
8 R	10 R	6 R	6.0 R	11 J	12 J	8 R	10 R	8 J	10 R	10 R	10 J	10 J
27	50	7	8.0	48	57	8 U	10 U	43	40	58	60	80
0.3 U	0.9	0.3 U	0.20 U	0.3 U	0.4	0.3 U	0.5 U	0.4	1.1	0.4 U	1.1	1.7
77	170	14	15	108	127.0	30.4	49.2	156	232	120	321	1040
69	138	8	8.0	79	97	10	33	84	133	90	176	423
0.20	0.30	0.05 U	0.040 U	0.15	0.200	0.07 U	0.24	0.24	0.70	0.26	0.97	4.86
15.0	37.0	7.0	7	24	22.0	12	87	29	22.0	21.0	70	72
0.5 U	0.7 U	0.4 U	0.30 U	0.5 U	0.5 U	0.5 U	0.8 U	0.5 U	0.8	0.9	0.8 U	0.8 U
119	121	26	31	203 J	198.0	32.9	48	125	126.0	216.0	244	118
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
936	505	19 U	19 U	86	11,389	85 J	1,639	703	1,057	497	1,631	10,550
26	41	19 U	19 U	20 U	560	19 U	73	20 U	120	24	19 U	1,000
25	25	19 U	19 U	20 U	29	19 U	16 J	11 J	38	42	120	200 U
66	37	19 U	19 U	20 U	1,100	19 U	160	59	110	28	84	2,200
69	42	19 U	19 U	20 U	1,600	19 U	120	53	99	33	87	1,800
560	220	19 U	19 U	57	7,600	47	960	450	490	240	1000	4,700
190	140	19 U	19 U	29	1,100	18 J	330	130	200	130	360	850
19 U	19 U	19 U	19 U	20 U	890	19 U	40	11 J	68	18 J	19 U	900
3,633	3,197	19 U	110 J	830 MJ	14,360	290 J	4,205	2,574	2,962	3,908	13,725	17,460
680	610	19 U	16 J	120	3,100	57	790	480	480	620	5,000	6,700
610	640 J	19 U	17 J	130	4,800	59	780	580	580	700	3,800	4,300
370	220 J	19 U	15 J	73	1,300	31	430	240	270	260	970	1,300
540	500 J	19 U	26	140	1,300	41	690	340	420	500	1,700	2,200
360 J	380 J	19 U	17 J	110	780 J	23	340	240	340	560	970	920
360 J	320 J	19 U	17 J	79	710 J	23	270	170	250	410	530	770
720 J	700 J	19 U	33 J	189	1,490 J	44	610	410	590	970	1,500	1,690
350 J	240 J	19 U	19 U	76	1,100 J	25	410	230	250	310	440	550
180 J	130 J	19 U	19 U	47	540 J	16 J	240	130	170	260	190	290
53 J	37 J	19 U	19 U	12 J	150 J	19 U	75	34 J	42	68	5	200 U
130 J	120 J	19 U	19 U	43	480 J	17 J	200	130	160	220	120	230
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
2.9	8.0 Y	0.87 U	0.95 U	3.5	2.9	0.91 U	0.96 U	3.4 Y	4.3 Y	3.0	6.6 Y	5.2
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
19 U	19 U	19 U	19 U	14 J	20 U	19 U	19 U	17 J	20 U	19 U	33	200 U
21 J	19 U	19 U	19 U	20 U	22 J	19 U	19 U	20 U	20 U	40	19 U	200 U
130	55 J	19 U	22	65	58	19 U	19 U	42 J	88	500	110	200 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	21 Y	20 U	19 U	19 U	200 U
19 U	36 J	19 U	19 U	56	100	19 U	54	38 J	25 J	48 J	19 U	200 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
19 U	43 J	19 U	19 U	20 U	20 U	21	180	20 U	260	28	19 U	200 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
95 U	97 U	94 U	97 U	100 UJ	98 UJ	97 U	97 U	100 UJ	98 U	96 U	96 U	980 U
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
190 U	190 U	190 U	190 U	200 U	88 J	190 U	190 U	200 U	41 J	190 U	190 U	2000 U
22	21	19 U	19 U	20 U	220	19 U	39	12 J	61	20	31	990
2.9	7.1 Y	0.87 U	0.95 U	3.1 Y	4.6	0.91 U	0.96 U	5.6	2.3 Y	4.3	4.8 Y	2.4 Y
19 U	19 U	19 U	19 U	20 U	20 U	19 U	19 U	20 U	20 U	19 U	19 U	200 U
6.6	16.0	1.7 U	1.9 U	3.4	67	1.8 U	1.9 U	260	2.0 U	2.7	18 Y	12 Y
3 Y	23 Y	1.7 U	1.9 U	2.8 Y	2.1 Y	1.8 U	1.9 U	5.5 Y	4.1	2.8 Y	17 Y	11 Y
22.0 Y	7.6 Y	1.7 U	0.4 Y	4.6 Y	26.0	1.8 U	1.9 U	420	2.0 U	3.5 Y	27 Y	18 Y
19 U	19 U	17 U	19 U	20 U	18 U	18 U	19 U	19 U	20 U	19 U	19 U	20 U
19 U	19 U	17 U	19 U	20 U	18 U	18 U	19 U	19 U	20 U	19 U	19 U	20 U
48 Y	220 Y	17 U	19 U	43 Y	140 Y	18 U	19 U	210 Y	28 Y	42 Y	19 U	99 Y
140	440	17 U	19 U	62 Y	160 Y	16 U	19 U	540 Y	36	53 Y	710	510
570	600	30	18 J	250	730	18 U	21	21,000	65	220	1800	680
37 U	37 U	35 U	38 U	170 Y	37 U	36 U	39 U	76 Y	40 U	140 Y	39 U	170 Y
19 U	19 U	17 U	19 U	20 U	18 U	18 U	19 U	19 U	130 Y	19 U	100 Y	20 U
710	1,040	30	18 J	250	730	36 U	21	21,000	101	220	2,510	1,190

(3) Total benzofluoranthene criterion represents the sum of the detected concentrations of the b and k isomers (the j isomer co-elutes with k). When all isomers were not detected, the highest detection limit was reported as the sum. Qualifiers were attached to the total benzofluoranthene value if any of the contributing concentrations were detected with that qualifier.

- Shaded cells denote exceedance of Hylebos Cleanup Committee Sediment Quality Objectives (SQO) criteria.

Chemical	Commencement Bay 500	Sample ID	AN-403 (0.0 to 0.3 ft)	AN-404 (0.0 to 0.3 ft)	AN-404A (0.3 to 1.9 ft)	AN-405 (0.0 to 0.3 ft)	AN-406 (0.0 to 0.3 ft)	AN-406A (1.0 to 3.0 ft)	AN-3104 (0.0 to 0.3 ft)	A
Tide Elevation in MLLW										
Phenols (ug/kg)										
Phenol	420		38 J	23 J	20 U	73 J	23 J	20 U	26 J	
2-Methylphenol	63		20 U	20 U	20 U	20 U	19 U	20 U	20 U	
4-Methylphenol	670		20 U	20 U	20 U	20 U	19 U	20 U	20 U	
2,4-Dimethylphenol	29		20 U	20 U	20 U	20 U	19 U	20 U	20 U	
Pentachlorophenol	360		98 UJ	99 UJ	98 U	98 UJ	98 UJ	100 U	99 UJ	
Miscellaneous Extractables (ug/kg)										
Benzyl alcohol	73		20 U	20 U	20 U	20 U	19 U	20 U	20 U	
Benzoic acid	650		200 U	200 U	200 U	200 U	190 U	200 U	200 U	
Dibenzofuran	540		20 U	20 U	20 U	20 U	19 U	20 U	20 U	
Hexachlorobutadiene	11		3.1	2.8	1.5 Y	4.0	2	1.0 U	2.1	
N-Nitrosodiphenylamine	28		20 U	20 U	20 U	20 U	19 U	20 U	20 U	
Pesticides (ug/kg)										
DDE	9.0		1.9 U	4.8	2.0 U	3.8	1.9 U	2.0 U	2.2	
DDD	16.0		3.1 Y	4.0	3.4	4.1 Y	1.9 U	2.0 U	2.3	
DDT	34.0		2.1 Y	1.9 U	2.0 U	2.5 Y	1.9 U	2.0 U	1.9 U	
PCBs (ug/kg)										
Aroclor 1016	---		19 U	19 U	20 U	19 U	19 U	20 U	19 U	
Aroclor 1242	---		19 U	19 U	20 U	19 U	19 U	20 U	19 U	
Aroclor 1248	---		45 Y	73 Y	23 Y	50 Y	19 U	20 U	30 Y	
Aroclor 1254	---		51 Y	130 Y	55	63 Y	29 Y	20 U	39 Y	
Aroclor 1260	---		77	89	35	100	30	20 U	45	
Aroclor 1221	---		120 Y	150 Y	39 U	150 Y	38 U	40 U	110 Y	
Aroclor 1232	---		19 U	19 U	20 U	19 U	28 Y	20 U	19 U	
Total PCBs (ug/kg)	300		77	89	90	100	30	40 U	45	

Part 2

Dry Weight Measurements

(0.0 to 0.3 ft)	AN-3111A (0.3 to 2.3 ft)	AN-3111B (2.3 to 4.3 ft)	AN-3113 (0.0 to 0.3 ft)	AN-3113A (0.3 to 2.3 ft)	AN-3113B (2.3 to 4.3 ft)	AN-4102 (0.0 to 0.3 ft)	AN-4109 (0.0 to 0.3 ft)	LT Master Composite	Surface Sediment Equipment Rinsate Blank (HY34-RBSS)	Surface Sediment Field Blank (HY34-FBSS)	Subsurface Sediment Equipment Rinsate Blank (HY34-RB)	Subsurface Sediment Field Blank (HY34-FB)
et	+8.2 feet	+8.2 feet	-26.6 feet	-31.3 feet	-31.3 feet	-35.3 feet	-30.0 feet	NA	NA	NA	NA	NA
	19 U	20 U	36 J	14 J	19 U	34	150	19 U	2 U	2 U	2 U	2 U
	19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
	19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
	19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	3 U	3 U	3 U	3 U
	97 U	99 U	96 U	98 U	96 U	93 U	97 U	97 U	5 U	5 U	5 U	5 U
	19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	5 U	5 U	5 U	5 U
	190 U	200 U	190 U	200 U	190 U	110 J	190 U	190 U	10 U	10 U	10 U	10 U
	19 U	20 U	20	20 U	19 U	79	19 J	19 U	1 U	1 U	1 U	1 U
	3.6	11	2.6	4.2	11	1.7 Y	4.0	4.6	0.05 U	0.05 U	0.05 U	0.05 U
	19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
	3.1	15	2.4	3.6	19	1.8 U	4.1	6.6	0.10 U	0.10 U	0.10 U	0.10 U
	4.2 Y	12	2.7 Y	4.4 Y	19	1.8 U	4.2 Y	6.4	0.10 U	0.10 U	0.10 U	0.10 U
	1.9 U	3.6 Y	1.9 U	1.9 U	2.6 Y	1.8 U	1.9 U	1.8 U	0.10 U	0.10 U	0.10 U	0.10 U
	19 U	20 U	19 U	19 U	19 U	18 U	19 U	18 U	1.0 U	1.0 U	1.0 U	1.0 U
	19 U	96 Y	19 U	19 U	19 U	18 U	34 Y	18 U	1.0 U	1.0 U	1.0 U	1.0 U
	57 Y	20 U	37 Y	48 Y	260 Y	18 U	19 U	100 Y	1.0 U	1.0 U	1.0 U	1.0 U
	94	560	54 Y	80 Y	600	18 U	60 Y	200	1.0 U	1.0 U	1.0 U	1.0 U
	79	180	69	110	370	37	120	150	1.0 U	1.0 U	1.0 U	1.0 U
	39 U	40 U	150 Y	66 Y	140 Y	35 U	37 U	36 U	2.0 U	2.0 U	2.0 U	2.0 U
	19 U	20 U	19 U	19 U	19 U	18 U	19 U	170 Y	1.0 U	1.0 U	1.0 U	1.0 U
	173	740	69	110	970	37	120	350				

Chemical	Commencement Bay SDO	Sample ID	AN-403 (0.0 to 0.3 ft)	AN-404 (0.0 to 0.3 ft)	AN-404A (0.3 to 1.9 ft)	AN-405 (0.0 to 0.3 ft)	AN-406 (0.0 to 0.3 ft)	AN-406A (1.0 to 3.0 ft)	AN-3104 (0.0 to 0.3 ft)	AN-3104A (0.3 to 1.9 ft)
udline Elevation in MLLW			-33.7 feet	-33.6 feet	-36.6 feet	-30.4 feet	-34.0 feet	-36.5 feet	-33.7 feet	-33.7 feet
Conventional Parameters										
Total solids (%)	---		44.4	46.7	63.4	43.5	55.9	80.7	51.2	---
Gravel (%)	---		2.3	1.5	0.7	0.4	3.5	2.2	2.5	---
Sand (%)	---		18.0	20.8	35.5	18.9	44.3	92.9	45.3	---
Silt (%)	---		49.7	45.5	45.1	50.2	31.9	3.7	31.7	---
Clay	---		30.0	32.2	18.7	30.5	20.3	1.2	20.5	---
Total organic carbon (%)	---		2.6	2.5	2	2.8	2.1	0.71	2.7	---
Metals (mg/kg)										
Antimony	150		10 R	10 R	8 R	10 R	9 R	6 R	9 R	---
Arsenic	57		30	20	12	20	16	6 U	19	---
Cadmium	5.1		0.5	0.5	0.4	0.5 U	0.4	0.2 U	0.4 U	---
Copper	390		102	81.3	36.1	112	75.8	13.2	99.9	---
Lead	450		61	52	16	47	28	2	42	---
Mercury	0.59		0.3	0.42	0.16	0.29	0.13	0.05 U	0.21	---
Nickel	140		23	20	15	21	18	11	17	---
Silver	6.1		0.7 U	0.6 U	0.6	0.7 U	0.5 U	0.4	0.6 U	---
Zinc	410		117	88	42.1	109	68	22.5	93	---
Organometallic Compounds (ug TBT ion/L)										
Tributyltin (interstitial water)	0.70		0.15	See Table 2	NA	See Table 2	See Table 2	NA	0.56	---
Organics (ug/kg)										
Total LPAH ⁽⁹⁻¹⁰⁾	5,200		175 J	71	60 J	230	48 J	20 U	91	---
Naphthalene	2,100		13 J	20 U	11 J	11 J	19 U	20 U	20 U	---
Acenaphthylene	1,300		12 J	20 U	20 U	16 J	19 U	20 U	20 U	---
Acenaphthene	500		20 U	20 U	20 U	10 J	19 U	20 U	20 U	---
Fluorene	540		14 J	20 U	20 U	16 J	19 U	20 U	20 U	---
Phenanthrene	1,500		78	47	33	120	34	20 U	65	---
Anthracene	960		38	24	16 J	57	14 J	20 U	26	---
2-Methylnaphthalene	670		20 U	20 U	20 U	20 U	19 U	20 U	20 U	---
Total HPAH ⁽⁶⁾	17,000		1,392	865 J	556 J	1,928 J	415 J	40	822 J	---
Fluoranthene	2,500		160	120	45	320	68	20 U	130	---
Pyrene	3,300		230	130	120	240	56	20 U	120	---
Benzo(a)anthracene	1,600		91	61	28	150	34 J	20 U	68	---
Chrysene	2,800		210	130	74	310	66	20 U	130	---
Benzo(b)fluoranthene	---		240	120	95	330	63	20 U	100	---
Benzo(k)fluoranthene	---		150	96	61	160	42	20 U	87	---
Benzo(a)fluoranthene (b+k) ⁽⁵⁾	3,600		390	216	156	490	105	40	187	---
Benzo(a)pyrene	1,600		120	79	50	170	39	20 U	74	---
Indeno(1,2,3-c,d)pyrene	690		77	67	32	120 J	24	20 U	51	---
Dibenz(a,h)anthracene	230		20	17 J	10 J	31	19 U	20 U	14 J	---
Benzo(g,h,i)perylene	720		74	55	41	97	23	20 U	48	---
Chlorinated Hydrocarbons (ug/kg)										
1,3-Dichlorobenzene	170		20 U	20 U	20 U	20 U	19 U	20 U	20 U	---
1,4-Dichlorobenzene	110		20 U	20 U	20 U	20 U	19 U	20 U	20 U	---
1,2-Dichlorobenzene	50		20 U	20 U	20 U	20 U	19 U	20 U	20 U	---
1,2,4-Trichlorobenzene	22		20 U	20 U	20 U	20 U	19 U	20 U	20 U	---
Hexachlorobenzene (HCB)	22		3.7	4.0	1.5	5.2	1.7	1.0 U	2.2	---
Phthalates (ug/kg)										
Dimethyl phthalate	160		12 J	20 U	20 U	11 J	19 U	20 U	20 U	---
Diethyl phthalate	200		20 U	20 U	20 U	20 U	19 U	20 U	20 U	---
Di-n-butyl phthalate	1,400		14 J	12 J	20 U	13 J	19 U	20 U	20 U	---
Butyl benzyl phthalate	900		20	9.9 J	20 U	18 J	19 U	20 U	12 J	---
Bis(2-ethylhexyl) phthalate	1,300		170	100	48 U	210	42	1100 B	160	---
Di-n-octyl phthalate	6,200		20 J	20 U	12 J	15 J	19 U	20 U	12 J	---

Part 2
Dry Weight Measurements

AN-3111A (0.3 to 2.3 ft)	AN-3111B (2.3 to 4.3 ft)	AN-3113 (0.0 to 0.3 ft)	AN-3113A (0.3 to 2.3 ft)	AN-3113B (2.3 to 4.3 ft)	AN-4102 (0.0 to 0.3 ft)	AN-4109 (0.0 to 0.3 ft)	LT Master Composite	Surface Sediment Equipment Rinsate Blank (HY34-RBSS)	Surface Sediment Field Blank (HY34-FBSS)	Subsurface Sediment Equipment Rinsate Blank (HY34-RB)	Subsurface Sediment Field Blank (HY34-FB)
+8.2 feet	+8.2 feet	-26.6 feet	-31.3 feet	-31.3 feet	-35.3 feet	-30.0 feet	NA	NA	NA	NA	NA
46.2	61.7	39.1	44.2	43.2	65	42.3	NA	NA	NA	NA	NA
0.2	0.2	2.8	3.2	5.3	12.0	4.2	NA	NA	NA	NA	NA
21.4	47.1	28.8	24.9	30.5	57.4	29.4	NA	NA	NA	NA	NA
51.5	40.1	47.2	54.7	44.6	19.0	40.6	NA	NA	NA	NA	NA
26.9	12.6	21.2	17.2	19.6	11.6	25.8	NA	NA	NA	NA	NA
3.3	1.5	3.4	5.0	5.1	1.7	3.4	NA	NA	NA	NA	NA
10 R	7 R	10 R	10 R	10 R	7 R	10 R		0.05 U	0.05 U	0.05 U	0.05 U
30	22	20	40	40	16	20	32	0.05 U	0.05 U	0.05 U	0.05 U
0.5	0.3 U	0.5 U	0.9	0.8	0.3 U	0.5	0.6	0.002 U	0.002 U	0.002 U	0.002 U
112	46.9	98.9	120	109	39.5	111	75.4	0.002 U	0.002 U	0.002 U	0.002 U
77	38	47	86	103	19	46	57	0.02 U	0.02 U	0.02 U	0.02 U
0.48	0.23	0.33	0.4	0.69	0.1	0.3	0.32	0.0001 U	1E-04 U	0.0001 U	0.0001 U
22	17	19	24	31	13	19	21	0.01 U	0.01 U	0.01 U	0.01 U
0.6 U	0.4 U	0.7 U	1.1	0.8	0.4 U	0.7 U	0.5 U	0.003 U	0.003 U	0.003 U	0.003 U
135	65.6	109	155	136	49.8	95	103	0.006 U	0.006 U	0.006 U	0.006 U
NA	NA	See Table 2	NA	NA	NA	0.11	72	NA	NA	NA	NA
82	37 J	491	194 J	239 J	2,794	894	159	1 U	1 U	1 U	1 U
19 U	20 U	21	20 U	13 J	28	114 J	19 U	1 U	1 U	1 U	1 U
19 U	20 U	40	18 J	26 J	46	28	15 J	1 U	1 U	1 U	1 U
19 U	20 U	25	20 U	12 J	100	30	19 U	1 U	1 U	1 U	1 U
19 U	20 U	35	14 J	18 J	220	42	19 U	1 U	1 U	1 U	1 U
54	24	220	110	97	2,100	540	88	1 U	1 U	1 U	1 U
28	13 J	150	52	73	300	140	56	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	22	19 U	19 U	1 U	1 U	1 U	1 U
1,001	526	4,097	2,043	2,611	6,728	4,425 J	2,267	1 U	1 U	1 U	1 U
120	47	520	270	250	3,000	1,900	260	1 U	1 U	1 U	1 U
160	96	600	320	440	1,400	560 J	460	1 U	1 U	1 U	1 U
69	31	280	140	160	430	290 J	130	1 U	1 U	1 U	1 U
160	66	630	320	400	640	550	300	1 U	1 U	1 U	1 U
130	73	730	320	440	400	360	320	1 U	1 U	1 U	1 U
120	72	480	210	290	300	270	270	1 U	1 U	1 U	1 U
250	145	1210	530	730	700	630	590	1 U	1 U	1 U	1 U
92	48	380	200	270	240	220	190	1 U	1 U	1 U	1 U
67	37	240	120	160	150	130	160	1 U	1 U	1 U	1 U
19	20 U	67	33	41	26	35 J	37	1 U	1 U	1 U	1 U
64	36	170	110	160	92	110	140	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
3.6	8.5	3.0	4.4	8.8 Y	1.6	4.8	4.4	0.05 U	0.05 U	0.05 U	0.05 U
19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	19 U	19 U	19 U	1 U	1 U	1 U	1 U
19 U	20 U	19 U	20 U	19 U	19 U	14 J	19 U	1 U	1 U	1 U	1 U
26	20 U	35	46 J	19 U	19 U	21 J	16 MJ	1 U	1 U	1 U	1 U
160	45	320	340 B	120 U	67	110 J	120	1 U	1 U	1 U	1 U
19 U	20 U	19 U	22 Y	45 Y	19 U	14 J	19 U	1 U	1 U	1 U	1 U

Chemical	Commencement Bay SQO	Sample ID	T19A-5 (0.0 to 0.3 ft)	T19A-6 (0.0 to 0.3 ft)	T19A-7 (0.0 to 0.3 ft)	T19A-8 (0.0 to 0.3 ft)	T20A-1 (0.0 to 0.3 ft)	T20A-5 (0.0 to 0.3 ft)	T20A-5A (0.3 to 1.5 ft)	T21A-2 (0.3 to 0.3 ft)
Baseline Elevation in MLLW			-21.7 feet	-16.4 feet	-0.2 feet	Not Recorded	-29.0 feet	-34.4 feet	-33.8 feet	-27.2 feet
Phenols (ug/kg)										
Phenol	420		46	100	20 U	12 J	33 J	20 U	19 U	19
2-Methylphenol	63		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
4-Methylphenol	670		19 U	19 U	20 U	55	19 U	20 U	19 U	19
2,4-Dimethylphenol	29		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
Pentachlorophenol	360		97 UJ	96 UJ	99 UJ	95 UJ	96 U	99 U	97 U	97
Miscellaneous Extractables (ug/kg)										
Benzyl alcohol	73		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
Benzoic acid	650		190 U	190 U	200 U	190 U	190 U	200 U	190 U	190
Dibenzofuran	540		15 J	36	20 U	10 J	36	20 U	19 U	41
Hexachlorobutadiene	11		2.1 UJ	2.1 Y	0.9 U	0.95 U	1.9	1.9	3.9 Y	3.0
N-Nitrosodiphenylamine	28		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
Pesticides (ug/kg)										
DDE	9.0		2.2 J	1.9 U	1.8 U	1.9 U	2.1	2.1	3.4	1.9
DDD	16.0		2.4 UJ	2.7 Y	1.8 U	1.9 U	1.8 U	1.8 U	4.9	3.5
DDT	34.0		1.9 UJ	1.9 U	1.8 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9
PCBs (ug/kg)										
Aroclor 1016	---		19 UJ	19 U	18 U	19 U	18 U	18 U	18 U	19
Aroclor 1242	---		19 UJ	21 Y	18 U	19 U	18 U	18 U	18 U	19
Aroclor 1248	---		37 UJ	19 U	18 U	19 U	21 Y	21 Y	49 Y	47
Aroclor 1254	---		39 UJ	41 Y	18 U	19 U	27 Y	27 Y	100	57
Aroclor 1260	---		90 J	120	30	19 U	56	56	69	130
Aroclor 1221	---		37 UJ	38 U	36 U	38 U	37 U	37 U	37 U	37
Aroclor 1232	---		19 UJ	19 U	18 U	19 U	75 Y	75 Y	18 U	110
Total PCBs (ug/kg)	300		90 J	120	30	38 U	56	56	169	130

Notes: J - Estimate

R - Result is rejected. See validation report for reasons for rejection.

U - Undetected at the detection limit shown.

Y - Indicates raised reporting limit due to interference.

NA - Not analyzed.

(1) 2-Methylnaphthalene is not included in the total LPAH calculation.

(2) Total LPAHs and HPAHs are the sum of all detected contaminants within the subheading. When all isomers were not detected, the highest detection limit was reported as the sum. Qualifiers were attached to the Total LPAHs or HPAHs value if any of the contributing concentrations were denoted with that qualifier.

(3) Total benzofluoranthene criterion represents the sum of the detected concentrations of the b and k isomers (the j isomer co-elutes with k). When all isomers were not detected, the highest detection limit was reported as the sum. Qualifiers were attached to the total benzofluoranthenes value if any of the contributing concentrations were denoted with that qualifier.

Shaded cells denote exceedance of Hylabos Cleanup Committee Sediment Quality Objectives (SQO) criteria.

Part 2
Dry Weight Measurements

T21A-2A (0.3 to 2.3 ft)	T21A-2B (2.3 to 4.1 ft)	T22A-2 (0.0 to 0.3 ft)	T22A-2A (0.3 to 2.3 ft)	T22A-2B (2.3 to 3.3 ft)	T23A-5 (0.0 to 0.3 ft)	T40A-4 (0.0 to 0.3 ft)	AN-302 (0.0 to 0.3 ft)	AN-321A (0.0 to 2.0 ft)	AN-401 (0.0 to 0.3 ft)	AN-402 (0.0 to 0.3 ft)	AN-402A (0.3 to 2.3 ft)
-26.9 feet	-26.9 feet	-31.3 feet	-32.8 feet	-32.8 feet	-35.7 feet	-30.8 feet	-29.9 feet	-36.0 feet	-36.4 feet	-35.2 feet	-34.9 feet
19 U	19 U	19 J	13 J	19 U	80	80	13 J	19 U	20 U	34 J	15 J
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
95 U	95 U	97 UJ	98 U	95 U	96 UJ	95 UJ	99 UJ	96 U	100 U	99 U	97 U
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
190 U	190 U	190 U	200 U	190 U	200 U	190 U	200 U	190 U	200 U	200 U	190 U
19 U	19 U	19 U	20 U	19 U	43	19 U	20 U	19 U	20 U	23	19 U
6.4	6.5 Y	3.9	9.5	11	2.0	3.4	3.7	4.4	1.8	4.4	4.7
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
4.6	10	4.1	7.9	19	2.2	3.0	5.9	8.7	2.0 U	1.9 U	2.7
6.7 Y	11	8.4	8.8 Y	11	2.0 U	3.4 Y	5.6	9.2	2.0 U	2.3 Y	3.6 Y
2.4 Y	2.9 Y	12 Y	1.9 U	7.8 Y	2.0 U	1.8 U	2.2 Y	3.7 Y	2.0 U	1.9 U	1.8 U
18 U	19 U	19 U	19 U	19 U	20 U	18 U	20 U	18 U	20 U	19 U	18 U
18 U	19 U	19 U	19 U	19 U	20 U	18 U	20 U	18 U	20 U	19 U	18 U
84 Y	150 Y	53 Y	110 Y	210 Y	20 U	45 Y	65 Y	18 U	20 U	30 Y	38 Y
120	320	64 Y	180 Y	430	46 Y	46 Y	110 Y	270	28 Y	41 Y	71 Y
150	230	78	220	270	85	85	87	110	42	61	88
250 Y	36 U	220 Y	98 Y	300 Y	39 U	260 Y	250 Y	36 U	110 Y	210 Y	52 Y
19 U	19 U	19 U	19 U	19 U	24 Y	18 U	20 U	39 Y	20 U	19 U	18 U
270	550	78	220	700	85	85	87	380	42	61	88

Chemical	Concentration Bay SGO	Sample ID	T19A-5 (0.0 to 0.3 ft)	T19A-6 (0.0 to 0.3 ft)	T19A-7 (0.0 to 0.3 ft)	T19A-8 (0.0 to 0.3 ft)	T20A-1 (0.0 to 0.3 ft)	T20A-5 (0.0 to 0.3 ft)	T20A-5A (0.3 to 1.5 ft)	T21A-2 0.3
Baseline Elevation in MLLW			-21.7 feet	-16.4 feet	-0.2 feet	Not Recorded	-29.0 feet	-34.4 feet	-33.8 feet	-27.2
Conventional Parameters										
Total solids (%)			43.5	42.1	76	46.4	43.2	53.3	65.9	43.3
Gravel (%)			2.7	3.5	6.4	18.3	10.6	5.1	1.3	10.6
Sand (%)			26.3	28.0	89.9	26.9	28.7	36.0	45.5	35.2
Silt (%)			43.0	42.1	3.7	29.1	40.5	38.8	37.7	35.1
Clay			28.0	26.4	0.0	25.7	20.2	20.1	15.5	19.1
Total organic carbon (%)			3.5	3.9	1	5.8	3.5	2.4	1.3	3.8
Metals (mg/kg)										
Antimony	150		10 R	10 R	6 R	10 R	10 R	9 R	7 R	10
Arsenic	57		30	30	6 U	10	30	26	18	30
Cadmium	5.1		0.4	0.5	0.3 U	0.4 U	0.4 U	0.3 U	0.3 U	0.4
Copper	390		96	102	25.7	29	96.3	83.6	49.7	112
Lead	450		59	59	12	14	48	49	26	57
Mercury	0.59		0.35	0.3	0.08 U	0.1	0.25	0.35	0.17	0.26
Nickel	140		22	19	11	216	19	20	16	20
Silver	6.1		0.6 U	0.7 U	0.4 U	0.6 U	0.9	0.7	0.4 U	0.7
Zinc	410		129	119	31.2	39	97	94	55.9	112
Organometallic Compounds (ug TBT ion/L)										
Tributyltin (interstitial water)	0.70		NA	NA	NA	NA	NA	NA	NA	NA
Organics (ug/kg)										
Total LPAH ^{(1) (2)}	5,200		800	2,653 J	211 J	102	1,003	423 J	31	1,230
Naphthalene	2,100		19 U	14 J	20 U	36	30	20 J	19 U	41
Acenaphthylene	1,300		26	52	13 J	19 U	50	24	19 U	74
Acenaphthene	500		20	77	20 U	19 U	47	23	19 U	77
Fluorene	540		54	100	11 J	19 U	76	27	19 U	78
Phenanthrene	1,500		540	2,200	150	66	440	230	31	680
Anthracene	960		160	210	37	19 U	360	99	19 U	280
2-Methylnaphthalene	670		19 U	16 J	20 U	20	25	17 J	19 U	30
Total HPAH ⁽²⁾	17,000		2,836	8,711 J	1,481 J	166 J	4,956	2,826	689	7,710
Fluoranthene	2,500		620	3,500	400	68	930	340	53	1,400
Pyrene	3,300		580	2,300	300 J	32	730	450	140	1,300
Benz(a)anthracene	1,600		270	420 J	140	14 J	430	200	31	600
Chrysene	2,800		320	850 J	180	25	800	390	76	1,100
Benzo(b)fluoranthene			180	520 J	94 J	16 J	650	580	110	1,100
Benzo(k)fluoranthene			240	350 J	100 J	11 J	490	300	90	680
Benzo(a)anthracene (b+k) ⁽³⁾	3,600		420	870 J	194 J	27 J	1,140	880	200	1,780
Benzo(a)pyrene	1,600		260	330 J	120 J	19 U	400	270	73	650
Indeno(1,2,3-c,d)pyrene	690		170	210 J	67 J	19 U	260	150	58	430
Dibenz(a,h)anthracene	230		36	51 J	15 J	19 U	66	36	19 U	100
Benzo(g,h,i)perylene	720		160	180 J	65 J	19 U	200	110	56	350
Chlorinated Hydrocarbons (ug/kg)										
1,3-Dichlorobenzene	170		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
1,4-Dichlorobenzene	110		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
1,2-Dichlorobenzene	50		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
1,2,4-Trichlorobenzene	22		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
Hexachlorobenzene (HCB)	22		2.5 J	2.7	0.9 U	0.95 U	2.3	2.3	4.1	4.2
Phthalates (ug/kg)										
Dimethyl phthalate	160		19 U	19 U	20 U	19 U	16.1	20 U	19 U	19
Diethyl phthalate	200		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19
Di-n-butyl phthalate	1,400		19 U	19 U	14 J	19 U	23 J	20 U	19 U	19
Butyl benzyl phthalate	900		19 U	53 J	17 J	19 U	32	26	19 U	100
Bis(2-ethylhexyl) phthalate	1,300		64	110 J	44	12 J	290	230	110	1,500
Di-n-octyl phthalate	6,200		19 U	19 U	20 U	19 U	19 U	20 U	19 U	19

Part 2

Dry Weight Measurements

T21A-2A (0.3 to 2.3 ft)	T21A-2B (2.3 to 4.1 ft)	T22A-2 (0.0 to 0.3 ft)	T22A-2A (0.3 to 2.3 ft)	T22A-2B (2.3 to 3.3 ft)	T23A-5 (0.0 to 0.3 ft)	T40A-4 (0.0 to 0.3 ft)	AN-302 (0.0 to 0.3 ft)	AN-321A (0.0 to 2.0 ft)	AN-401 (0.0 to 0.3 ft)	AN-402 (0.0 to 0.3 ft)	AN-402A (0.3 to 2.3 ft)
-26.9 feet	-26.9 feet	-31.3 feet	-32.8 feet	-32.8 feet	-35.7 feet	-30.8 feet	-29.9 feet	-36.0 feet	-36.4 feet	-35.2 feet	-34.9 feet
47.4	58.4	43.7	47.9	56.5	54.4	48.9	45.4	60	54	46.4	54.4
2.1	2.3	5.8	0.7	0.6	4.6	1.6	2.2	1.5	6.5	0.8	1.5
32.5	41.2	16.1	20.9	35.7	42.8	36.8	24.2	47.5	44.4	39.6	35.3
45.1	38.9	45.8	51.9	45.3	32.8	37.6	41.4	36.8	32.4	43.5	43.5
20.3	19.6	32.3	26.5	18.4	19.8	24.0	32.2	14.2	16.7	26.1	19.7
3.4	2.6	2.9	3	2.2	2.7	2.4	3.2	2.3	2.6	2.5	2.4
10 R	13 J	10 R	10 R	8 R	9 R	12 J	10 R	8 R	9 R	10 R	9 R
45	66	20	40	23	16	21	30	19	25	30	35
0.4 U	0.4	0.4 U	0.5	0.3 U	0.4 U	0.4 U	0.5	0.3 U	0.3 U	0.4 U	0.7
112	120	101	125	63.8	99	84.3	108	57.4	66.7	92.6	118
83	89	45	78	53	36	41	55	32	37	46	75
0.38	0.65	0.29	0.46	0.39	0.21	0.2	0.29	0.18	0.19	0.25	0.31
18	23	20	23	18	16 U	18	24	20	18	18	20
0.6 U	0.5 U	0.7 U	1	0.7	0.5	0.6 U	0.6 U	0.5 U	0.6	1.1	0.5 U
159	216	122	135	83	92	91	187	61.4 J	80	96	134
NA	NA	See Table 2	NA	NA	0.68	NA	0.38	NA	NA	NA	NA
305	205	82	152	136	1,985	235	60 J	51	269	678	244 J
19 U	19 U	19 U	11 J	16 J	15 J	19 U	20 U	19 U	20 U	23	12 J
30	29	19 U	14 J	16 J	20 U	10 J	20 U	19 U	24	36	16 J
19 U	19 U	19 U	20 U	10 J	180	12 J	20 U	19 U	20 U	48	11 J
19	19 U	19 U	14 J	14 J	190	18 J	20 U	19 U	25	51	15 J
180	110	50	99	82	1,200	140	41	32	120	360	130
76	66	32	53	54	400	55	19 J	19 J	120	160	80
19 U	19 U	19 U	20 U	10 J	32	19 U	20 U	19 U	20 U	21	19 U
853	2,148 J	734 J	1,850 J	2,363 J	3,682	1,765 J	805 J	1,091	2,346	3,797	2,276 J
200	300	130	240	220	610	390	170 J	73	260	530	340
800	400 J	82	260	360	820	290	140	270	310	570	340
170	130	59	120	130	430	140	52	35	170	290	170
440	240	150	280	360	470	310	130	130	410	560	330
440	310	94	350 J	480 J	240	180	98	220	350	610	320 J
270	240	67	180 J	260 J	250	160	71	120	280	370	240 J
710	550	161	530 J	740 J	490	340	169	340	630	980	560 J
210	220	61	180 J	240 J	320	130	57	100	220	350	220 J
170	150	37	110 J	150 J	160	79	38	64	160	260	140 J
43	38	11 J	30 J	43 J	52	25 J	11 J	19 U	36	57	36 J
110	120	33	100 J	140 J	130	71	38	79	130	200	140 J
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
19 U	19 U	19 U	20 U	11 J	20 U	19 U	20 U	19 U	20 U	20 U	19 U
5.8	5.7 Y	4.3	7.9	8.0	2.6	4.1	4	3.8	2.2	3.1	3.7
19 U	19 U	19 U	11 J	19 U	20 U	19 U	20 U	19 U	20 U	19 J	19 U
19 U	19 U	19 U	20 U	19 U	20 U	19 U	20 U	19 U	20 U	20 U	19 U
19 U	19 U	12 J	21 J	15 J	13 J	19 U	9.9 J	19 U	20 U	20 U	14 J
27	19 U	11 J	38 J	29 J	20 U	24 J	20 U	19 U	20 U	25	38 J
160	640	180	340 B	180 U	56	88	68	31	160	250	280 B
19 U	19 U	19 U	30 Y	19 U	20 U	11 J	16 J	19 U	20 U	20 U	19 U

Tributyltin Data Evaluation

Chemical	Commencement Bay SQC	Sample ID	T22A-2 (0.0 to 0.3 ft)	T23A-5 (0.0 to 0.3 ft)	AN-302 (0.0 to 0.3 ft)	AN-103 (0.0 to 0.3 ft)	AN-404 (0.0 to 0.3 ft)	AN-405 (0.0 to 0.3 ft)	AN-406 (0.0 to 0.3 ft)	AN-3104 (0.0 to 0.3 ft)	AN-3111 (0.0 to 0.3 ft)	AN-3113 (0.0 to 0.3 ft)	AN-4109 (0.0 to 0.3 ft)	LT Master Composite
Organometallic Compounds (ug TB ⁺ Ion/L)														
Tributyltin (Interstitial water) - Original Sample Results	0.70		NA	0.88	0.38	0.15	NA	NA	NA	0.56	0.46	NA	0.11	72
Tributyltin (Interstitial water) - Archived Sample Results						0.13 J	0.03 J	0.05 J	0.10 J	NA	NA	0.03 J	NA	NA
Tributyltin (Interstitial water) - Estimate Upper Bound Concentration (considering possible loss during extended holding times)	0.70		0.07 J	0.16 J	NA	NA	0.18 J	0.29 J	0.55 J	NA	NA	0.14 J	NA	NA

Notes:

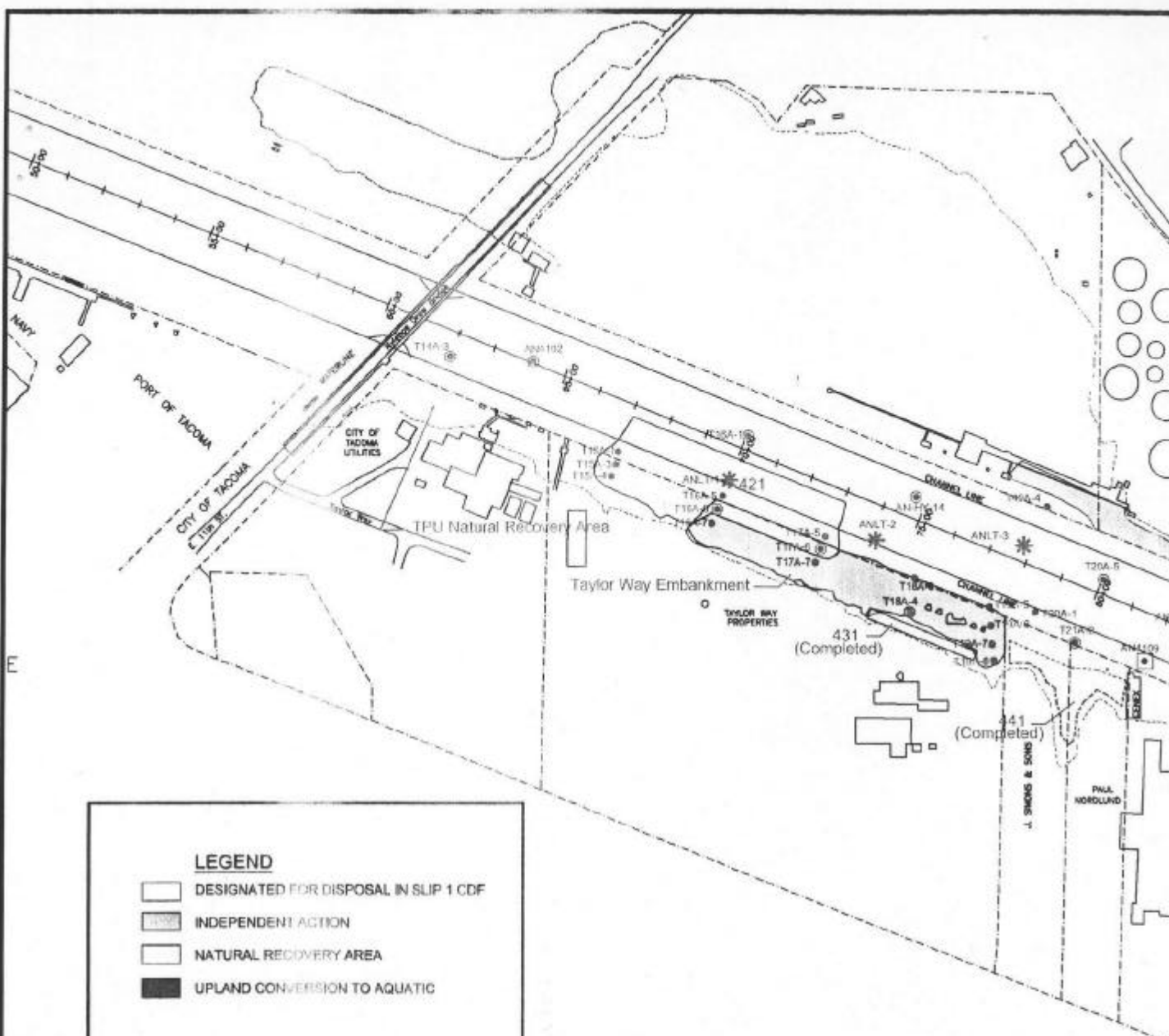
J - Indicates an estimated concentration when the value is less than the calculated reporting limit.

NA - Not analyzed.

- Shaded cells denote exceedance of Hylebos Cleanup Committee Sediment Quality Objectives (SQC) criteria.

FIGURES





LEGEND

- DESIGNATED FOR DISPOSAL IN SLIP 1 CDF
- INDEPENDENT ACTION
- NATURAL RECOVERY AREA
- UPLAND CONVERSION TO AQUATIC

SAMPLE IDENTIFICATION

- T11A-3
ACTUAL SURFACE SAMPLE LOCATION AND ID
- T11A-4
ACTUAL CORE AND SURFACE SAMPLE LOCATION AND ID
- T11A-4
ACTUAL CORE LOCATION AND ID
- THIN COLUMN LEACHING TEST CORE COMPOSITE

200



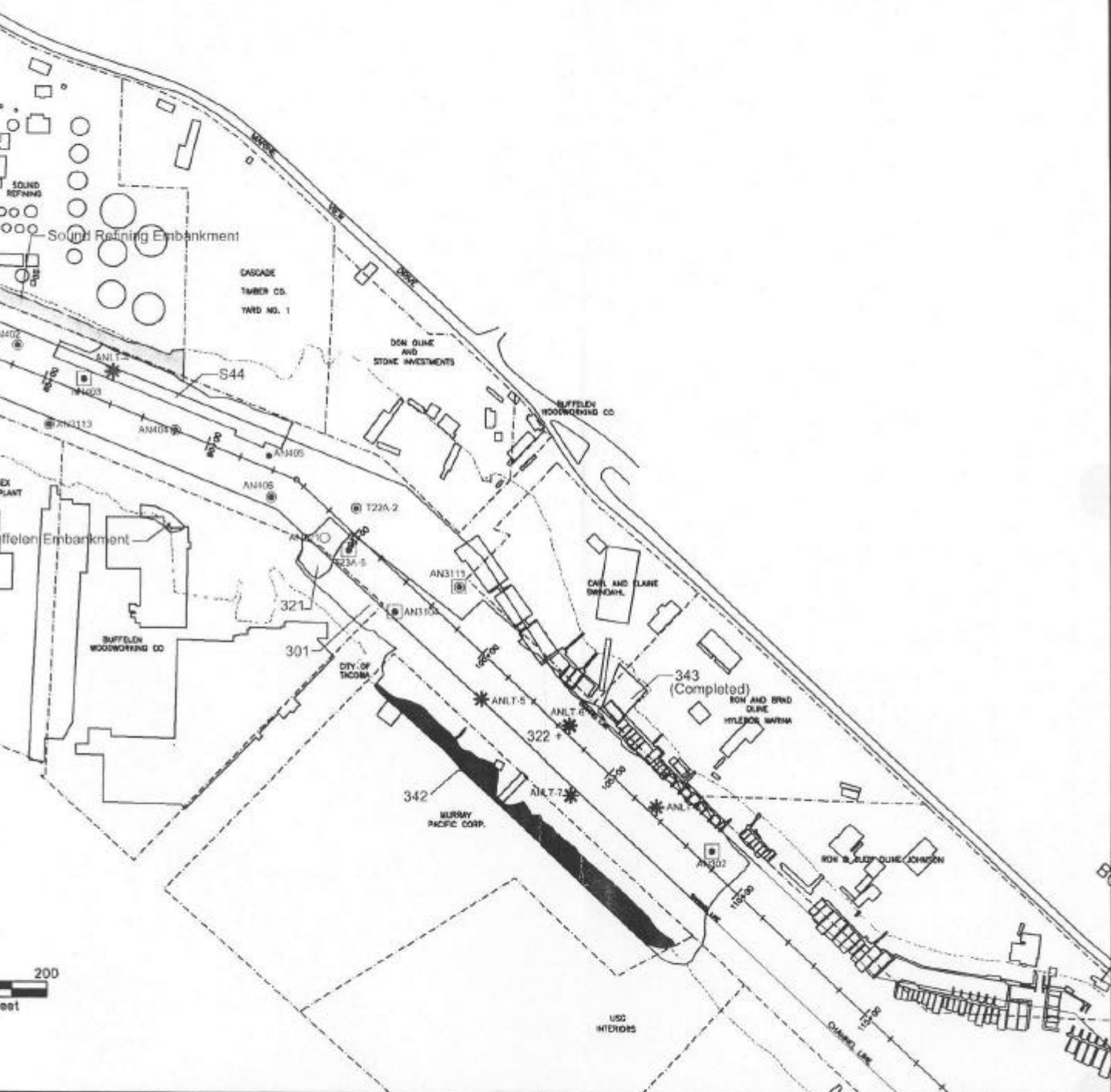


Figure 1
Sampling Locations and Prospective Cleanup Boundaries
Hylebos Waterway Segments 3 & 4
Port of Tacoma and Glenn Springs Holdings

APPENDIX A

WORK PLAN/SAMPLING AND ANALYSIS PLAN



**Phase I Hylebos Mouth Cleanup
Segments 3 & 4 Dredge Design
Work Plan/Sampling and Analysis Plan**

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May 4, 2001

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1 INTRODUCTION

Anchor Environmental (Anchor) has been retained by the Port of Tacoma (Port) and Glenn Springs Holdings (GSH) to develop an appropriate strategy for possible expansion of Hylebos Waterway sediment cleanup areas into Segments 3 and 4 (see Figure 1). This Work Plan identifies uncertainties associated with the scope of cleanup within these areas, and describes the data collection activities required to fill key data gaps.

2 SEDIMENT REMEDIATION OPTIONS

The Port and GSH have discussed three different general concepts for sediment remediation in this area of the waterway, corresponding to a range of potential sediment dredging volumes, as summarized in Table 1 below.

Table 1. Summary of Prospective Dredge Volumes in Segments 3 & 4 of the Hyleb

Primary Sediment Remediation Areas Described in EPA's Recent ESD & SOW:	Volume in cy ^(a)		
	Base Dredging Volume (as set forth by EPA)	Plus Dredging of Natural Recovery Areas Between Pierhead Lines	Complete Channel Dredging to Pierhead Lines
TPU Natural Recovery (SMA 402)	N/A	N/A	N/A
Taylor Way (SMA 421) ^(b)	62,000	62,000	62,000
Sound Refining Embankment (SMA 432)	Capping	Capping	Capping
Sound Refining Shoaling Area (S44)	20,000	20,000	20,000
Simons Natural Recovery (SMA 401)	N/A	22,000	22,000
Buffalen (SMA 321)	2,000	2,000	2,000
Buffalen/Murray Natural Recovery (SMA 301)	N/A	12,000	12,000
Murray-Pacific Channel Area (SMA 322)	48,000	48,000	48,000
Murray-Pacific Embankment ^(c)	33,000	33,000	33,000
Subsurface Sediment Areas ^(d)	N/A	N/A	100,000
TOTAL DREDGE VOLUME	165,000	199,000	299,000

NOTES:

- (a) Conservatively assuming that the final dredge cut is 2 feet below the deepest historical dredge depth.
- (b) Based on preliminary Anchor redesign of the dredge cut in this area to avoid undercutting the existing bank and to maximize efficiencies. The volume of this SMA presented in the PRDE report was 86,000 cy. Depending on how embankment remediation is integrated into the final design, the dredge volume in this area could be reduced to as low as 50,000 cy.
- (c) Based on PSSDA sampling, contaminated surface and subsurface sediments in this area are targeted for removal.
- (d) Approximate areas with clean surface sediments, underlain by subsurface sediments that likely will not meet PSSDA.

Based on an initial review of prospective dredging volumes and implementation plans, complete channel dredging between the pierhead lines within Segments 3 and 4 of the Hylebos Waterway will likely prove to be impracticable (i.e., funding for the 3rd scenario presented above may be problematic). Thus, this Work Plan will focus on resolving uncertainties associated with implementing one of the other remediation scenarios outlined above (i.e., base dredging with or without natural recovery areas). Specific areas of uncertainty to be addressed by this effort include:

- Determining how embankment remediation within the Taylor Way area (SMA 421) can be most appropriately integrated into the overall remediation plan for this area,

in order to achieve cleanup standards and concurrently minimize habitat mitigation requirements and costs, and also minimize potential future encumbrances to navigation. This objective will be achieved through the collection and evaluation of 17 surface samples immediately offshore of the Taylor Way Properties site.

- Determining whether natural recovery areas located within the main channel and adjacent berthing areas (i.e., SMAs 301, 302, and 401) will in fact achieve cleanup standards without active remediation. This objective will be achieved through the collection and evaluation of nine surface sediment samples and two subsurface sediment cores within SMAs 301, 302, and 401.
- Refining and/or confirming the depth of contamination in prospective dredging areas, in order to reduce uncertainties in the total dredge volume of Segments 3 and 4. This objective will be achieved through the collection and evaluation of four subsurface sediment cores within the prospective dredging areas.
- Determining whether disposal of contaminated dredge material from Segments 3 and 4 have the potential to pose water quality concerns at the Blair Slip 1 disposal site. This objective will be achieved through the collection of eight subsurface sediment cores for thin-layer column leach testing (TCLT).

Sampling station locations are depicted in Figure 1. The samples will be analyzed for the parameters listed in Table 2.

3 PROJECT TEAM AND RESPONSIBILITIES

The project team and responsibilities for tasks associated with the Segment 3 and 4 dredge design are as follows:

- Ms. Kim Magruder of Anchor will provide overall direction to the field sampling in terms of logistics, personnel assignments, and field operations.
- Ms. Sally Fisher of GeoEngineers Inc., located in Tacoma, Washington, will be responsible for logging the subsurface sediment samples, assisting with the subsurface sediment sample processing, and collection of the groundwater sample.
- Mr. Mark Harris from Analytical Resources, Inc. (ARI), located in Seattle, Washington, will be responsible for the sediment chemistry analyses.
- Mr. Harold Benny from Rosa Environmental and Geotechnical Laboratory (REG), located in Seattle, Washington, will be responsible for the TCLT, sediment index parameter analyses, and physical parameter analyses.

4 SAMPLE COLLECTION AND PROCESSING

This section describes the number and type of samples to be collected, the sampling schedule, the sampling platform, equipment decontamination procedures, and sample collection and processing techniques for each sample type. All sample collection activities will be coordinated by Anchor personnel.

A total of 26 surface sediment samples, 6 subsurface sediment cores (to be processed into 2 samples per core to yield 12 samples total), 8 subsurface sediment cores for TCLT, and 1 groundwater sample for TCLT will be collected as shown in Figure 1. Sample collection activities are scheduled for the week of July 9, 2001.

Surface and subsurface sediment sample collection will be conducted off of the research vessel, *R/V Nancy Anne*, which will be operated under the direction of Bill Jaworski, owner of Marine Sampling Systems (MSS). The *R/V Nancy Anne* is an aluminum, flat deck, 36-foot long, 14-foot wide catamaran vessel with twin 120-horsepower engines, and a draft ranging from 18 inches at the bow to 24 inches at the stern. The vessel is equipped with a 14-foot high hydraulically operated A-frame with boom, a variable speed winch (3,000 pound capacity with speeds of 1 to 3 feet per second), and 270 square feet of deck space. The vessel is also equipped with a pilot house, seawater pumps, differential global positioning system (DGPS), and a depth sounder.

Horizontal positioning at each sampling location will be determined using an on-board Trimble DGPS with a Northstar GPS unit as backup if necessary. Station positions will be reported in latitudinal and longitudinal coordinates (North American Datum [NAD] 83) to the nearest 0.1 second. The accuracy of the horizontal coordinates will be within 3 meters. Vertical elevation of each sampling station will be measured using a fathometer or lead line and converted to mean lower low water (MLLW). Tidal elevations will be determined using measured data from the National Oceanographic and Atmospheric Administration's (NOAA's) automated tide gage located in Commencement Bay, Tacoma, Washington.

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with sediment sample material must meet high

standards of cleanliness. All equipment and instruments in contact with the sediments will be made of glass, stainless steel, or polytetrafluoroethylene (PTFE), and will be cleaned prior to each day's use and between sampling or compositing events. Decontamination of all items will follow Puget Sound Estuary Program (PSEP) protocols. The decontamination procedure follows:

- Pre-wash rinse with tap water
- Wash with solution of tap water and Alconox soap
- Rinse with tap water
- Rinse three times with distilled water
- Cover (no contact) all decontaminated items with aluminum foil
- Store in clean, closed container for next use if possible

The analytical lab will provide certified, pre-cleaned, EPA-approved containers for all samples. Prior to shipping, the analytical laboratory will add preservative, where required, according to PSEP protocols.

Table 3 provides the recommended containers, preservation techniques, and holding times for conventional, organic, and inorganic compounds necessary to meet the requirements specified in PSEP protocols (PSEP 1997a).

Specific sample collection techniques for each type of sample are described in the following sections.

4.1 Surface Sediment

Surface sediment samples from the 0 to 10-cm biologically active zone will be collected for chemical and physical testing using a van Veen grab sampler in accordance with PSEP protocols (PSEP 1997a). The sampler is patented and operated by MSS under the direction of Bill Jaworski and has been effective in improving sediment penetration recovery. The sampler utilizes a modified hydraulic hinged jaw assembly for sample collection. Upon contact with sediments, the jaws are drawn shut to collect the sample. The sampler is used to collect large volume, surficial sediment samples. Samples will be collected in the following manner in accordance with the PSEP protocols:

-
- Vessel will maneuver to proposed location
 - Jaw assembly will be decontaminated
 - Jaw assembly will be deployed
 - The cable to the jaw assembly will be drawn in taut and perpendicular
 - Location of the cable hoist will be measured and recorded by the location control personnel
 - The jaw assembly will be drawn shut to collect the sediment sample to a penetration depth of approximately 15-cm for a 0 to 10-cm grab
 - The sediment sample will be retrieved aboard the vessel and evaluated against the following PSEP acceptability criteria:
 - van Veen sampler is not overfilled (i.e., sediment surface against top of sampler)
 - Sediment surface is relatively flat, indicating minimal disturbance or winnowing
 - Overlying water is present, indicating minimal leakage
 - Overlying water has low turbidity, indicating minimal sample disturbance
 - Desired penetration depth is achieved
 - Overlying water will be siphoned off and a stainless steel trowel or similar device will be used to collect only the desired sediment fraction from inside the van Veen sampler, taking care not to collect sediment in contact with the sides/surface of the sampler
 - The desired sediment fraction from the inside of the van Veen sampler will be placed in a stainless steel container. When sufficient sample volume has been collected, the sediment will be homogenized using a stainless steel spoon
 - Homogenized sediment will be placed immediately into appropriate pre-labeled sample containers (certified, pre-cleaned) and placed immediately on ice for transport to the appropriate laboratory

4.2 Subsurface Sediment

Sediment boring samples will be collected using a vibracorer. The vibracorer unit consists of two contra-rotating electric motors encased in an aluminum housing. An electric generator on the vessel via a submersible tether cable powers the vibracorer. When energized, the motors produce a high-frequency vibration capable of penetrating most unconsolidated strata.

The vibracorer will be deployed from the bow of the vessel using an A frame and winch assembly. A 3.75-in. inside diameter decontaminated aluminum pipe will be cut to the appropriate length based on the sampling depth at each location and clamped to the vibracorer. The vibracorer will be deployed over the bow and sent to the bottom, where the unit will then be energized and lowered to the appropriate depth. When that depth is reached, the vibracorer will be turned off and returned to the surface for sample processing. During the coring operation, the penetration of the core pipe is continuously monitored. The core will then be capped and stored on ice for transport to the compositing site (REG).

The elevation of each boring station will be measured. This will be accomplished using a fathometer or lead line to determine the depth at the sampling location. Tidal elevation at each sampling location will be corrected to MLLW using tide data obtained from the Commencement Bay NOAA gaging station. Each boring will be driven just past the deepest historical dredge depth at each location.

The following procedure will be used to decontaminate sample tubes prior to use:

- Rinse and pre-clean with potable water
- Wash and scrub the tubes in a solution of laboratory grade non-phosphate based soap and potable water
- Rinse with potable water
- Rinse three times with distilled water
- Seal both ends of each core tube with aluminum foil

The core tube caps will be removed immediately prior to placement into the coring device. Care will be taken during sampling to avoid contact of the sample tube with potentially contaminated surfaces. Extra sample tubes will be available during sample operations for uninterrupted sampling in the event of a potential core tube breakage or contamination. Core tubes suspected of having been accidentally contaminated will not be used. Logs and field notes of all core samples will be maintained as samples are collected and correlated to the sampling location map. The following information will be included in this log:

- Names of field supervisor and person(s) collecting and logging in the sample
- Location of each boring station as determined by DGPS
- Date and time of collection
- Elevation of each boring station sampled as measured from MLLW
- Observations made during sample collection including: weather conditions, complications, ship traffic, and other details associated with the sampling effort
- The sample station number as derived from Figure 1 and Table 4
- Length and depth intervals of each core section and recovery for each sediment boring as measured from MLLW
- Qualitative notation of apparent resistance of sediment column to coring
- Any deviation from the approved sampling plan

During deployment and retrieval of the coring device, care will be taken to ensure that the end of the core tube does not become contaminated. Core tubes longer than 3 feet will be cut in half to facilitate upright storage, **with the exception of core tubes collected for TCLT**. For TCLT cores, core tubes will be cut into 2-foot sections and will be processed separately as described in Section 3.3. The cut tubes will be individually labeled. Core orientation will also be marked on each tube. Labels identifying the core section will be securely attached to the outside of the casing and wrapped with transparent tape to prevent loss or damage of the label. The core sections will be stored upright in iced containers.

All working surfaces and instruments will be thoroughly cleaned, decontaminated, and covered with aluminum foil to minimize outside contamination between processing samples. Disposable gloves will be discarded after processing each station and replaced prior to handling decontaminated instruments or work surfaces.

Each core section will be documented as discussed below. A sediment description of each core sample will be recorded on the core log for the following parameters as appropriate and present:

- Sample recovery (depth in feet of penetration and sample compaction)
- Physical soil description in accordance with the Unified Soil Classification System (includes soil type, density/consistency of soil, color)
- Odor (e.g., hydrogen sulfide, petroleum, etc.)
- Vegetation
- Debris
- Biological activity (e.g., detritus, shells, tubes, bioturbation, live or dead organisms)
- Presence of oil sheen
- Any other distinguishing characteristics or features

After the physical characteristics of each core are documented, the native layer of each core will be clearly identified, if present. The number of samples submitted for chemical analysis will depend on the depth of the native layer. For cores where the native layer is located within the top 4 feet of sediment, a 2-foot section of the core will be collected approximately 6-inches below the top of the native layer for chemical analyses. The purpose of these samples will be to verify that chemical constituents have not penetrated the native layer and to confirm that native layer chemical concentrations are relatively low. For cores where the native layer is located below the top 4 feet of sediment, the core will be processed in 2-foot intervals below the surface, extending to a depth of 2 feet below the native layer interface. For instance, if the native layer were to be identified at a depth of 8 feet below mudline, four discrete sediment samples would be collected at the following intervals: 2 to 4 feet, 4 to 6 feet, 6 to 8 feet, and 8 to 10 feet. Anchor will

work with the Port and GSH to determine which of these samples are submitted for chemical analysis, and which are to be archived for possible subsequent analysis.

4.3 Thin-Layer Column Leach Test Sediment

Sediment boring samples for TCLT will be collected in the same manner as the sediment borings for chemical/physical analyses, with the following exceptions:

- Sediment cores will be cut into 2-foot sections
- Sediment cores will be extruded at REG in a nitrogen chamber (oxygen-free atmosphere)

To ensure container conditions remain anoxic, sample collection protocols will include capping, taping, and continuous icing of the core segments until delivery to REG.

Anoxic extrusion and processing of core samples will follow standard REG procedures.

4.4 Groundwater

To estimate the potential leachate quality from the Slip 1 confined disposal facility (CDF), site ground water will be used as the leach water in the TCLT. Groundwater will be collected in accordance with the Event 1C Sampling and Analysis Plan (SAP) Addendum (SEA et al., 1996). Site groundwater will be obtained from the groundwater well located adjacent to Slip 1 in the Blair Waterway.

5 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Field quality assurance samples will be used to evaluate the efficiency of field decontamination procedures. All field quality control samples will be documented in the site logbook.

One rinsate blank and one field blank will be collected for each type of sampling conducted (e.g., surface sediments, subsurface sediments, and groundwater). The rinsate blank consists of rinsing down the sampling equipment after sample collection and decontamination with distilled water (for sediments) or distilled deionized water (for groundwater) and collecting the rinsate. The field blank consists of pouring the distilled water (for sediments) or distilled deionized water (for groundwater) directly into the sampling containers.

6 SAMPLE TRANSPORT AND CHAIN-OF-CUSTODY PROCEDURES

Chain-of-custody forms will be used to track sample custody, which is an important aspect of field investigation activities that documents the proper handling and integrity of the samples. Custody seals will be placed on all sample shipment containers prior to shipment in order to detect any tampering which may have occurred during transport. All containerized sediment samples will be shipped to the analytical laboratory after preparation is completed. Specific sample shipping procedures will be as follows:

- Each cooler or container containing the sediment samples for analysis will be shipped via overnight delivery to the appropriate analytical laboratory
- Individual sample containers will be placed in a sealable plastic bag, packed to prevent breakage and transported in a sealed ice chest or other suitable container
- The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container and consultant's office name and address) to enable positive identification
- Glass jars will be separated in the shipping container by shock absorbent material (e.g., bubble wrap) to prevent breakage
- Ice will be placed in separate plastic bags and sealed
- A sealed envelope containing chain-of-custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler
- Signed and dated chain-of-custody seals will be placed on all coolers prior to shipping

Upon transfer of sample possession to the analytical laboratory, the persons transferring custody of the sample container will sign the chain-of-custody form. Upon receipt of samples at the laboratory, the shipping container seal will be broken and the receiver will record the condition of the samples. Chain-of-custody forms will be used internally in the lab to track sample handling and final disposition.

7 DATA QUALITY OBJECTIVES

The overall data quality objectives for this investigation are summarized in Table 5. The laboratory quality control sample analysis frequencies are provided in Table 6.

8 THIN-LAYER COLUMN LEACH TESTING

A composite sediment sample representing the material to be dredged will be submitted for TCLT to evaluate chemical mobility through the dredge material at the proposed nearshore disposal site (Slip 1). TCLT methods used in the evaluation of chemical mobility for the Hylebos Event 1C Phase I and Phase II events (SEA et al., 1996) will be followed.

A subsample of the sediment composite will be submitted to ARI for the analysis listed in Table 7. In addition, the following physical tests and partitioning parameters will be conducted on the TCLT sediment composite:

- Atterberg limits
- Specific gravity
- Consolidation
- Shear strength
- Cation exchange capacity (CEC)

In order to assess chemical stability of the leach water over time, the anaerobic sitewater will be monitored for the parameters listed in Table 7. During the TCLT, method performance will be assessed by examining rinsate and duplicate analyses collected during the test.

Porewater obtained from the leachate test will be submitted to ARI for the analysis of the parameters listed in Table 7.

9 CHEMICAL/CONVENTIONAL ANALYSES

ARI, an Ecology-certified laboratory located in Seattle, Washington, will conduct all physical and chemical testing except for Atterberg limits, specific gravity, consolidation, shear strength, CEC, and grain size distribution, which will be analyzed by REG, a geotechnical laboratory located in Seattle, Washington. All chemical/physical testing will adhere to the most recent PSEP quality assurance/quality control (QA/QC) procedures (PSEP 1997b) and PSEP analysis protocols. Metals and organic compounds will be analyzed according to the guidelines provided in PSEP (1997c) and PSEP (1997d), respectively. Method 9060 (EPA 1986) will be used for the analysis of TOC because the analytical method for TOC in PSEP (1986) is now out of date (PTI 1995). Atterberg limits, specific gravity, consolidation, shear strength, and CEC will be analyzed according to American Society for Testing and Materials (ASTM) methods. The analytical methods and target detection limits are presented in Tables 2 and 7.

In addition to the field QA/QC procedures that will be implemented (Section 5), one of the samples submitted for chemical analysis will be analyzed as a laboratory matrix spike/matrix spike duplicate (MS/MSD). Additional laboratory quality control will include method blanks, method blank spikes, surrogate compound analysis, and standard reference material analysis.

10 DATA VALIDATION AND REPORT PREPARATION

Data packages will be checked for completeness immediately upon receipt from the laboratory to ensure that data and QA/QC information requested are present. Data quality will be assessed using current EPA and Ecology protocols by considering the following:

- Holding times
- Surrogate spike results
- MS/MSD or MS/Duplicate results
- Standard reference material results
- Method blanks
- Detection limits

The data will be validated in accordance with the project specific data quality objectives described in Section 7 and EPA's functional guidelines for the validation of organic and inorganic data (*USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, February 1994; USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994*).

A Refined Remediation Plan containing the results of the surface sediment, subsurface sediment, and TCLT samples will be submitted to the Port and GSH for review. Data that exceed applicable sediment or water quality criteria will be highlighted in data tables. Bold text or other highlighting tools will be used to identify criterion exceedances, and to enable legible copies of this information. A narrative of quality assurance results and all quality assurance data will be attached to the Refined Remediation Plan as an appendix.

11 REFERENCES

EPA. 1986. Test procedures for solid waste. 3rd Edition. SW-846. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

PSEP. 1986. Recommended protocols for measuring conventional sediment variables in Puget Sound. Prepared for U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

PSEP. 1997a. Recommended guidelines for sampling marine sediment, water column, and tissue in Puget Sound. Final Report. Prepared for U.S. Environmental Protection Agency, Seattle, Washington, and the Puget Sound Water Quality Action Team, Olympia, Washington.

PSEP. 1997b. Recommended quality assurance and quality control guidelines for the collection of environmental data in Puget Sound. Draft Report. Prepared for U.S. Environmental Protection Agency, Seattle, Washington.

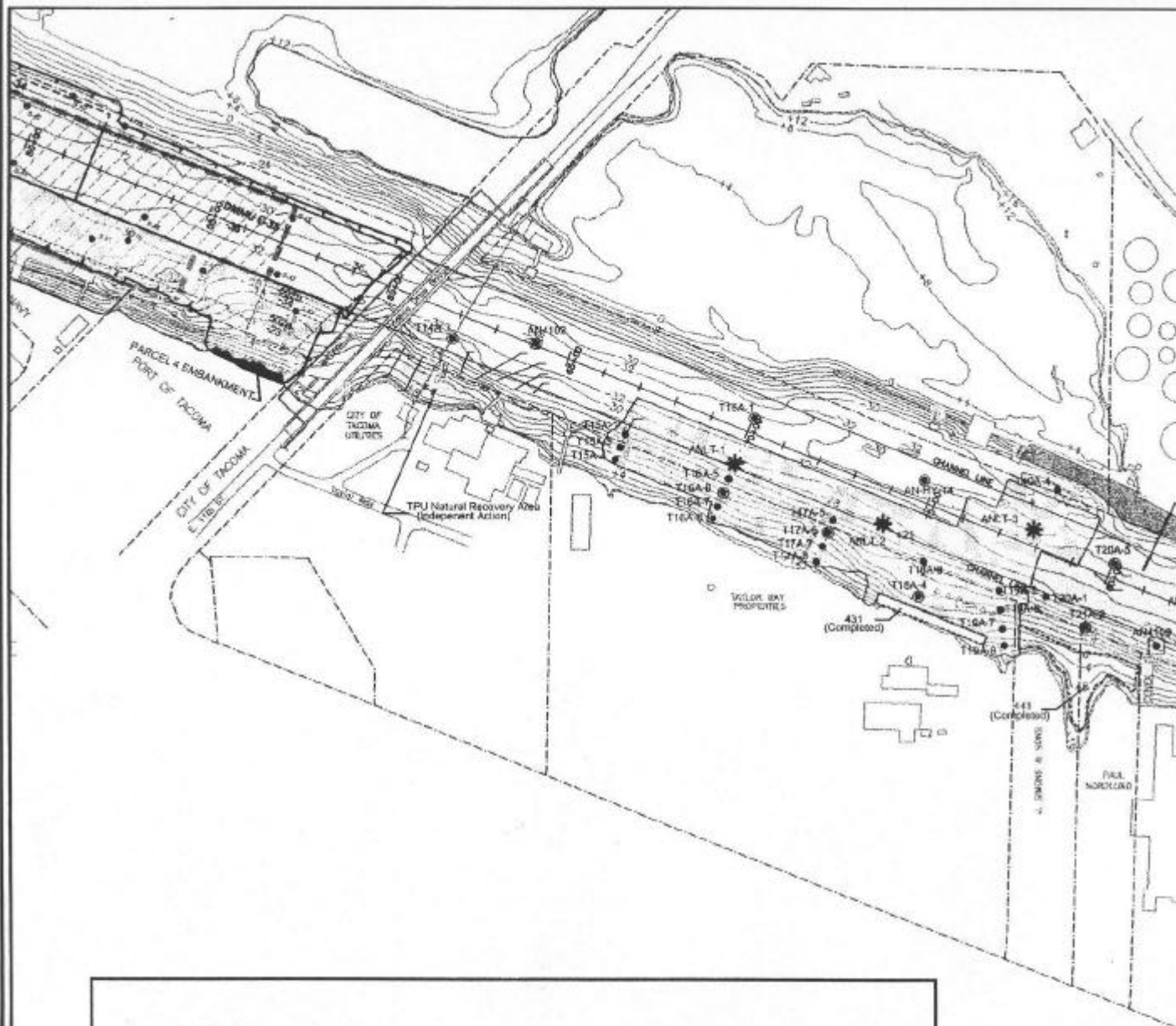
PSEP. 1997c. Recommended guidelines for measuring metals in Puget Sound water, sediment and tissue samples. Final Report. Prepared for U.S. Environmental Protection Agency, Seattle, Washington, and the Puget Sound Water Quality Action Team, Olympia, Washington.

PSEP. 1997d. Recommended guidelines for measuring organic compounds in Puget Sound water, sediment and tissue samples. Final Report. Prepared for U.S. Environmental Protection Agency, Seattle, Washington, and the Puget Sound Water Quality Action Team, Olympia, Washington.








PTI. 1995. Sediment sampling and analysis plan appendix- guidance on the development of sediment sampling and analysis plans meeting the requirements of the Sediment Management Standards (Chapter 173-204 WAC). Draft. Prepared for Washington State Department of Ecology.

Striplin Environmental Associates, Inc. (SEA), DMD, Inc., and Dinnel Marine Research.
1996. Hylebos Pre-Remedial Design Program: Technical Memorandum for Event 1C
Phase I and Phase II Data. Prepared for the Hylebos Cleanup Committee. Striplin
Environmental Associates, Inc., Olympia, Washington.







Figures and Tables



LEGEND

-  DESIGNATED FOR DISPOSAL IN SLIP 1 CDF
-  PSDA DISPOSAL UNITS (DMMUs)
-  CAPPING AREAS
-  NATURAL RECOVERY AREA
-  UPLAND CONVERSION TO AQUATIC
-  PRELIMINARY DREDGE AREA - PRDE REPORT
-  DREDGE PLAN (DESIGNATION & DEPTH)

SAMPLE IDENTIFICATION

-  T11A-3 PROPOSED SURFACE SAMPLE LOCATION AND ID
-  T11A-4 PROPOSED CORE AND SURFACE SAMPLE LOCATION AND ID
-  T11A-4 PROPOSED CORE LOCATION AND ID
-  PROPOSED THIN COLUMN LEACHING TEST CORE COMPOSITE
-  HISTORIC SAMPLE LOCATIONS AND ID
-  TBT SURFACE SAMPLE

200
S

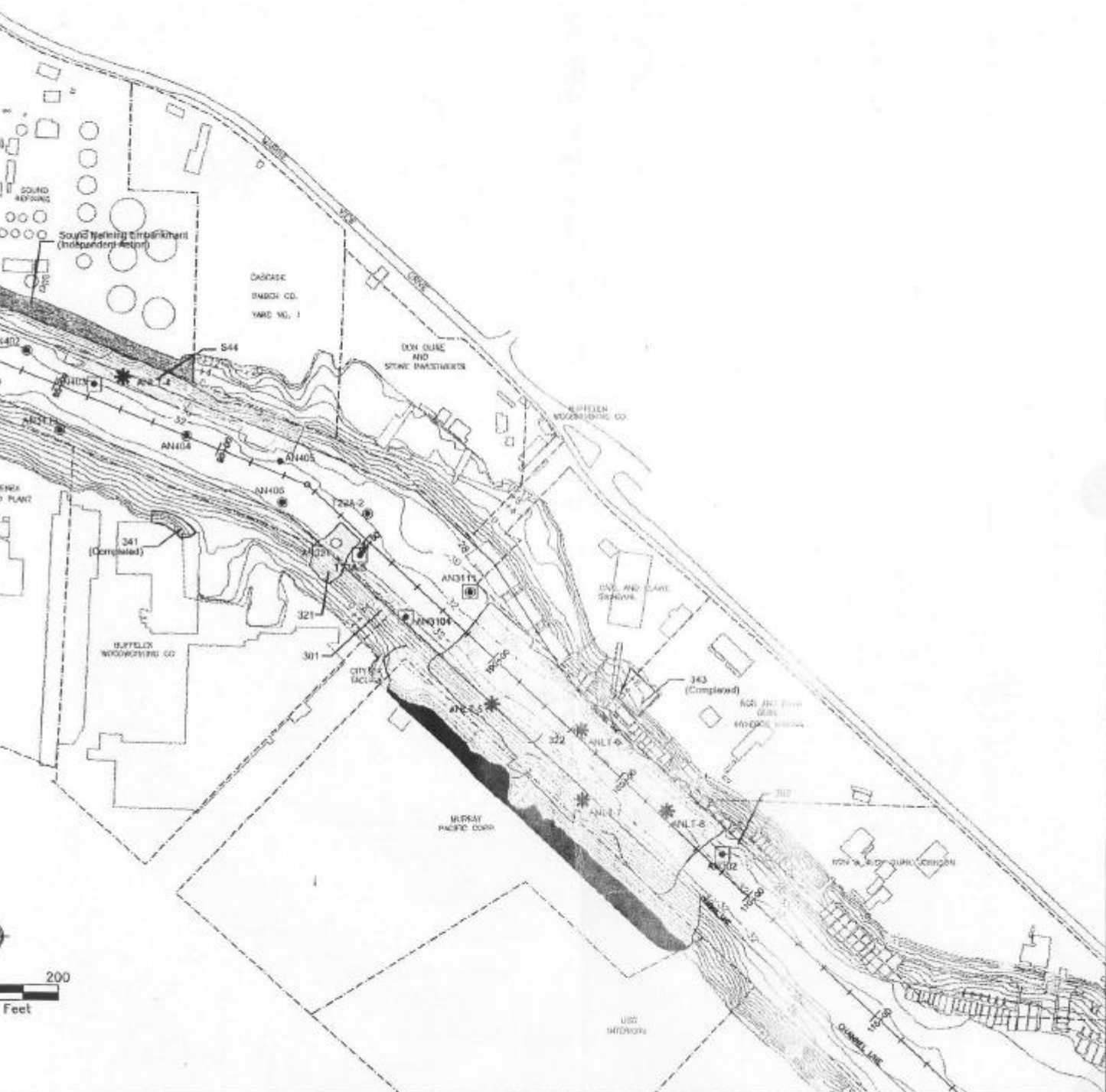


Figure 1
Proposed Sampling Locations
Hylebos Waterway Segments 3 & 4
Port of Tacoma and Glenn Springs Holdings

Table 2. Chemical/Physical Analysis Methods and Target Detection Limits

Parameter	Target Detection Limits	Sample Preparation Method	Sample Cleanup Method	Analytical Method
Sediments				
Conventionals				
Total solids in %	NA	---	---	EPA 160.3
Grain size in %	0.10%	---	---	PSEP
Total organic carbon in %	0.015%	---	---	EPA 9060
Metals				
Antimony	15 mg/kg dry	EPA 3050	---	EPA 6010
Arsenic	10 mg/kg dry	EPA 3050	---	EPA 6010
Cadmium	0.40 mg/kg dry	EPA 3050	---	EPA 6010
Copper	0.40 mg/kg dry	EPA 3050	---	EPA 6010
Lead	5.0 mg/kg dry	EPA 3050	---	EPA 6010
Mercury	0.10 mg/kg dry	---	---	EPA 7471
Nickel	14 mg/kg dry	EPA 3050	---	EPA 6010
Silver	0.60 mg/kg dry	EPA 3050	---	EPA 6010
Zinc	0.80 mg/kg dry	EPA 3050	---	EPA 6010
Tributyltin in porewater	0.07 ug TBT/L	Krone	---	EPA 8270/SIM
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAHs)				
Naphthalene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Acenaphthylene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Acenaphthene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Fluorene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Phenanthrene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Anthracene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
2-Methylnaphthalene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAHs)				
Fluoranthene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Pyrene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzo(a)anthracene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Chrysene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzo(b)fluoranthene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzo(k)fluoranthene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzo(a)pyrene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Indeno(1,2,3-cd)pyrene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Dibenzo(a,h)anthracene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzo(g,h,i)perylene	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Phthalates				
Dimethyl phthalate	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Diethyl phthalate	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Di-n-butyl phthalate	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Butyl benzyl phthalate	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Bis(2-ethylhexyl)phthalate	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Di-n-octyl phthalate	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Pesticides and Miscellaneous Extractables				
4,4'-DDE	8 ug/kg	EPA 3550	EPA 3640	EPA 8081
4,4'-DDD	8 ug/kg	EPA 3550	EPA 3640	EPA 8081
4,4'-DDT	8 ug/kg	EPA 3550	EPA 3640	EPA 8081
Hexachlorobenzene	8 ug/kg	EPA 3550	EPA 3640	EPA 8081
Hexachlorobutadiene	8 ug/kg	EPA 3550	EPA 3640	EPA 8081

Table 2. Chemical/Physical Analysis Methods and Target Detection Limits

Parameter	Target Detection Limits	Sample Preparation Method	Sample Cleanup Method	Analytical Method
Polychlorinated Biphenyls (PCBs)				
Arochlor 1016	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor 1221	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor 1232	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor 1242	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor 1248	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor 1254	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor 1260	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Arochlor	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Total PCBs	20 ug/kg	EPA 3550	EPA 3640 and EPA 3665	8082
Chlorinated Organic Compounds				
1,2-Dichlorobenzene	20 ug/kg	EPA 3550	---	EPA 8270
1,3-Dichlorobenzene	20 ug/kg	EPA 3550	---	EPA 8270
1,4-Dichlorobenzene	20 ug/kg	EPA 3550	---	EPA 8270
1,2,4-Trichlorobenzene	20 ug/kg	EPA 3550	---	EPA 8270
Miscellaneous Extractables				
Phenol	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
2-Methylphenol	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
4-Methylphenol	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
2,4-Dimethylphenol	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Pentachlorophenol	50 ug/kg	EPA 3550	EPA 3640	EPA 8270
Dibenzofuran	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
N-Nitroso-diphenylamine	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzyl alcohol	20 ug/kg	EPA 3550	EPA 3640	EPA 8270
Benzoic acid	200 ug/kg	EPA 3550	EPA 3640	EPA 8270

Notes:

(a) The sample digestion method for mercury is described in the analytical method.

Table 3. Guidelines for Sample Handling and Storage

Sample Type	Container Size and Type	Holding Time	Preservation Technique
Sediments			
Grain size	16-oz Glass	6 months	Cool/4°C
Total solids	4-oz Glass (combined)	7 days	Cool/4°C
Total organic carbon		28 days	Cool/4°C
Metals	4-oz Glass	6 months; 28 days for Hg	Cool/4°C
Tributyltin	2 X 32-oz Glass	7 days from collection to porewater analysis	Cool/4°C/zero headspace
Semivolatile Organics	16-oz Glass (combined)	14 days	Cool/4°C
PCBs		14 days	Cool/4°C

Table 4. Hylebos Segment 3 & 4 Subsurface Sediment Sample Jar Matrix

Sample ID	Grain size	TS/TOC	Metals	SVOCs/PCBs
	16-oz Glass	4-oz Glass	4-oz Glass	16-oz Glass
T14A-3	X	X	X	X
AN-4102	X	X	X	X
T16A-1	X	X	X	X
T16A-6A	X	X	X	X
T16A-6B	X	X	X	X
T16A-6C	X	X	X	X
T16A-6D	X	X	X	X
T17A-8A	X	X	X	X
T17A-8B	X	X	X	X
T17A-8C	X	X	X	X
T17A-8D	X	X	X	X
AN-HY-14	X	X	X	X
T18A-4A	X	X	X	X
T18A-4B	X	X	X	X
T18A-4C	X	X	X	X
T18A-4D	X	X	X	X
T20A-5A	X	X	X	X
T20A-5B	X	X	X	X
T20A-5C	X	X	X	X
T20A-5D	X	X	X	X
T21A-2A	X	X	X	X
T21A-2B	X	X	X	X
T21A-2C	X	X	X	X
T21A-2D	X	X	X	X
AN-402	X	X	X	X
AN-3113	X	X	X	X
AN-404	X	X	X	X
AN-406	X	X	X	X
AN-321A	X	X	X	X
AN-321B	X	X	X	X
AN-321C	X	X	X	X
AN-321D	X	X	X	X
T22A-2	X	X	X	X
AN-3111	X	X	X	X

Note:

PCBs - Polychlorinated biphenyls

SVOCs - Semivolatile organic compounds

TS - Total solids

TOC - Total organic carbon

Table 5. Data Quality Objectives

Parameter	Units	Precision	Accuracy	Completeness
<i>Sediments</i>				
Grain size	%	±20 RSD ^a	NA	100%
Total solids	%	±10 RPD ^b	NA	100%
Total organic carbon	%	±20 RPD	65 – 135 %R ^c	100%
Metals	mg/kg	±20 RPD	65 – 135 %R	100%
Tributyltin	ug TBT Ion/L	±40 RPD	50 – 140 %R	100%
Semivolatile organics	µg/kg	±40 RPD	50 – 140 %R	100%
Pesticides/PCBs	µg/kg	±40 RPD	50 – 140 %R	100%

Notes:

(a) Relative standard deviation.

(b) Relative percent difference.

(c) Percent recovery.

NA – Not applicable.

Table 6. Laboratory Quality Control Sample Analysis Summary

Analysis Type	Initial Calibration	Ongoing Calibration	Standard Reference Material	Replicates	Matrix Spikes	Matrix Spike Duplicates	Method Blanks	Surrogate Spikes
Sediments								
Grain size	Each batch ^a	NA	NA	1 per 20 samples	NA	NA	NA	NA
Total solids	Each batch ^b	NA	NA	1 per 20 samples	NA	NA	NA	NA
Total organic carbon	Daily or each batch	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	NA	Each batch	NA
Metals	Daily	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	NA	Each batch	NA
Tributyltin	As needed ^c	1 per 10 samples	1 per 20 samples	NA	1 per 20 samples	1 per 20 samples	Each batch	Every sample
Semivolatile organics	As needed ^c	1 per 10 samples	1 per 20 samples	NA	1 per 20 samples	1 per 20 samples	Each batch	Every sample
Pesticides/PCBs	As needed ^c	1 per 10 samples	1 per 20 samples	NA	1 per 20 samples	1 per 20 samples	Each batch	Every sample

Note:

NA - not applicable.

a - Calibration and certification of drying ovens and weighing scales are conducted bi-annually.

b - Initial calibration verification and calibration blank must be analyzed at the beginning of each batch.

c - Initial calibrations are considered valid until the ongoing continuing calibration no longer meets method specifications. At that point, a new initial calibration is performed.

Table 7. Analyte List for TCLT Porevolumes (in ug/L)

Parameter	Water Quality Criteria	Target Detection Limits
TCLT Leachate		
Metals		
Arsenic	36	2.0
Cadmium	9.3	2.0
Chromium (total)	50	5.0
Copper	3.1	2.0
Lead	8.5	3.0
Mercury	0.025	0.010
Nickel	8.2	5.0
Silver	1.9	0.10
Zinc	81	10
Tributyltin (ion)	0.37	0.02
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAHs)		
Naphthalene	2350 (acute)	1.0
Acenaphthylene	NA	1.0
Acenaphthene	710	1.0
Fluorene	NA	1.0
Phenanthrene	4.6	1.0
Anthracene	NA	1.0
2-Methylnaphthalene	NA	1.0
High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAHs)		
Fluoranthene	16	1.0
Pyrene	NA	1.0
Benzo(a)anthracene	NA	1.0
Chrysene	NA	1.0
Benzo(b)fluoranthene	NA	1.0
Benzo(k)fluoranthene	NA	1.0
Benzo(a)pyrene	NA	1.0
Indeno(1,2,3-cd)pyrene	NA	1.0
Dibenzo(a,h)anthracene	NA	1.0
Benzo(g,h,i)perylene	NA	1.0
Phthalates		
Dimethyl phthalate	NA	1.0
Diethyl phthalate	NA	1.0
Di-n-butyl phthalate	NA	1.0
Butyl benzyl phthalate	NA	1.0
Bis(2-ethylhexyl)phthalate	NA	4.0
Di-n-octyl phthalate	NA	2
Pesticides and Miscellaneous Extractables		
4,4'-DDE	0.001	0.004
4,4'-DDD	0.001	0.004
4,4'-DDT	0.001	0.004
Hexachlorobenzene	NA	0.002
Hexachlorobutadiene	32 (acute)	0.002

Table 7. Analyte List for TCLT Porevolumes (in ug/L)

Parameter	Water Quality Criteria	Target Detection Limits
Polychlorinated Biphenyls (PCBs)		
Arochlor 1016	0.03	0.04
Arochlor 1221	0.03	0.08
Arochlor 1232	0.03	0.04
Arochlor 1242	0.03	0.04
Arochlor 1248	0.03	0.04
Arochlor 1254	0.03	0.04
Arochlor 1260	0.03	0.04
Total PCBs	0.03	0.08
Chlorinated Organic Compounds		
1,2-Dichlorobenzene	NA	1.0
1,3-Dichlorobenzene	NA	1.0
1,4-Dichlorobenzene	NA	1.0
1,2,4-Trichlorobenzene	NA	1.0
Miscellaneous Extractables		
Phenol	5800 (acute)	2.0
2-Methylphenol	NA	1.0
4-Methylphenol	NA	1.0
2,4-Dimethylphenol	NA	3.0
Pentachlorophenol	7.9	5.0
Dibenzofuran	NA	1.0
N-Nitroso-diphenylamine	NA	1.0
Benzyl alcohol	NA	5.0
Benzoic acid	NA	50

Note: For some analytes/compounds, sample volume limitations preclude the laboratory's ability to meet the water quality criteria.

APPENDIX B

SURFACE SEDIMENT COLLECTION LOGS



Project Name: 146603 3/4 Project No: 010049-11 T2 Station ID: T14A-3

Sampling Crew: Dan Heaney, Dale Dickinson, Brian Gervan
Sampling Vessel: R/V NANCY ANN Sampling Method: Hydraulic Van Veen
Subcontractor(s): DICKINSON (MSS) GERVAN (BEK)
Station Coordinates: N / Lat. 47° 16.6373' N Weather: Partly Cloudy ~ 70°F
E / W / Long. 122° 22.6319' W (65°F)
Datum: NAD 83 WGS 84 Zone: W. 10 S 15 E SE

Sample Number: T-14A-3
Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans (SVOCs)
(TS) Grain Size / TOC / TVS / Ammonia / Sulfides
(Circle Appropriate Analyses)

Field Test Results

Comments: _____

Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: _____ ml Coarse: _____ ml Fines: _____

MAIDLINE CALC = -43' + 7.93' = -35.1' MWD 8/19/01 Rm validated

Grab Number: 1 Water Depth: 43' Penetration Depth: 25 cm Time: 09:30

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle) Date 0628

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	<u>3 small green</u>
gravel	<u>gray</u>	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	<u>brown surface</u>	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DBH



Surface Sediment Field Sample Record

Collection Date: 7/14/01
Shipping Date: 7/14/01

Project Name: Hylebos 3/4 Project No: C10049-11 T2 Station ID: 4N-7102

Sampling Crew: Dan Hornessy, Dale Dickinson, Brian Gowan
Sampling Vessel: R/V Nancy Anne Sampling Method: Auger with VPR
Subcontractor(s): Dickinson (MS) Gowan (BGR)
Station Coordinates: N/Lat. 47° 16.6367' N Weather: Clear 65°F wind SWS & SE
E/W/Long. 122° 23.5751' W
Datum: NAD 83 / WGS 84 Zone:

Sample Number: AN 4102
Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans
(S) Grain Size / TOC / TVS / Ammonia / Sulfides
(Circle Appropriate Analyses)

VOCs

Field Test Results

Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: _____ ml Coarse: _____ ml Fines: _____

Comments: _____

MODULUS = $-43.0 + 7.73 = -35.3$ mmw Validated 8/19/01 K

Grab Number: 1 Water Depth: 43 Penetration Depth: 22 cm Time: 09:54

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	Light Green w/ white wood chips, show frags.
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DPH and DD

Project Name: Hylebos 3/4 Project No: 010049-11 T2 Station ID: TISA-4

Sampling Crew: Dan Hennessy, Dale Dickinson, Brian Goulet

Sampling Vessel: R/V. Nancy Anne Sampling Method: Hydraulic Grab

Subcontractor(s): DICKINSON (MS) Goulet (BEIC)

Station Coordinates: N 1 lat. 47° 16.580' N Weather: 0' CIST 65°F wind SKTS 6-9

E/W/Long. 122° 23.543' W

Datum: MAD 83 WGS 84 Zone: _____

Sample Number: TISA-4

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans (VOCs)

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results Comments: _____

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: ml Coarse: _____ ml Fines: 2

MDLNE = -10 + 7.32 = -2.6 -2.7' muds vibrated 8/19/01 R

Grab Number: _____ Water Depth: 10 ft Penetration Depth: 24 cm Time: 10:33

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u> small wood debris,
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u> Petroleum
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u> Petroleum
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u> Petroleum
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DFL



Surface Sediment Field Sample Record

Collection Date: 7/12/01
Shipping Date: 7/14/01

Project Name: Hyllebo 3/4 Project No: C10049-11 T2 Station ID: T15A-3

Sampling Crew: DAN HONNIGSEN, DALE DICKINSON, BRIAN COVICH

Sampling Vessel: R/V NANCY ANN

Sampling Method: HYDRAULIC GRAB

Subcontractor(s): DICKINSON (GSS) COVICH (GSS)

Station Coordinates: N / Lat. 47° 16.5937' N

Weather: LIGHT, 65°F, WIND SWS 0-5E

E / W / Long. 122° 23.5367' W

Datum: MAD 83 / WGS 84

Zone:

Sample Number: T15A-3

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

SVOCs

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

MUDLINE = -16' + 7.01' = -9.01' minus validated 8/19/01 Kew

Grab Number: 1 Water Depth: 16 ft Penetration Depth: 24 cm Time: 1052

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

2" RIFE IN SAMS
LIGHT GREEN
SHELL FRAGS

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD TDELT



Surface Sediment Field Sample Record

Collection Date: 7/12/01
Shipping Date: 7/14/01Project Name: Hydros 3/4 Project No: C10049-11 T2 Station ID: TICA-8Sampling Crew: DAN HENNESSY, BAILEY DICKINSON, BRIAN GOURANSampling Vessel: PLV NANCY ARNESampling Method: HYDRAULIC GRABSubcontractor(s): DICKINSON (MSS), GOURAN (BER)Station Coordinates: N / Lat. 47° 16.563' NWeather: Overcast 65°F Wind SE @ 10 SEE / W / Long. 122° 23.481' WDatum: NAD 83 / WGS 84

Zone:

Sample Number: TICA-8Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-FuransSVOCSTS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

MUDLINE = -3' + 6.43 = +3.4' MUDS Validated 8/19/01 KGrab Number: 1 Water Depth: 3 ft Penetration Depth: X Time: 11:20

Bioassay / Chemistry (circle) AVS/SEM: Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	<u>REJECT -</u> <u>BRICKS IN JARS</u>
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: Hand Sampled Water Depth: 5 ft MUD Penetration Depth: < 10 cm Time: 15:38

Bioassay / Chemistry (circle) AVS/SEM: Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	<u>none</u> H2S	<u>Hand sampled</u> <u>not a. not made</u> <u>6-7 jars</u>
gravel	gray	slight Petroleum	
<u>sand C M F</u>	black	moderate other:	
silt clay	<u>brown</u>	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM: Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM: Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DPH

Project Name: Hydro 3/4 Project No: 010049-11TZ Station ID: T16A-7

Sampling Crew: DAN HENNESSY, DALE DICKINSON, BRIAN GOURAN

Sampling Vessel: E/V NAUCY ANNIE

Sampling Method: HYDRAULIC GRAB

Subcontractor(s): DICKINSON (MSS), GOURAN (BER)

Station Coordinates: N / Lat. 47° 16.5699' N

Weather: C'CAST, 65°F, WIND SE 5-10 K

E / W / Long. 122° 23.4800' W

Datum: NAD 83 WGS 84

Zone:

Sample Number: T16A-7

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

SVOCs

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

MUDLINE = -6.4 + 6.17 = -0.23' mudline validated 8/14/01 Rm

Grab Number: 1

Water Depth: 6.4 ft

Penetration Depth: 20 cm

Time: 11:28

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	<u>DARK</u> brown	strong
organic matter	brown surface	overwhelming

Comments:

TRACE SMALL SHELL FRAGS

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Recorded by: DD + DPH

Project Name: Hydrocos 3/4 Project No: 010049-11 T2 Station ID: T16A-6

Sampling Crew: DAN HENNESSY, DAVE DICKINSON, BRIAN GORAN
Sampling Vessel: R/V NANCY ANN Sampling Method: HYDRAULIC GRAB
Subcontractor(s): DICKINSON (MSS) GORAN (BPK)
Station Coordinates: N / Lat. 47° 16.5754' N Weather: PART C'CAST, 65°F, WIND S-KTS SE
E / W / Long. 122° 23.4749' W
Datum: NAD 83 WGS 84 Zone:

Sample Number: T16A-6
Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans SUCCs
TS / Grain Size / TOC / TVS / Ammonia / Sulfides
(Circle Appropriate Analyses)

Field Test Results

Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: _____ ml Coarse: _____ ml Fines: _____

Comments: _____

MDLINE = 19.5 + 5.94 = 25.44' MINUS 8.14' DIKINSON

Grab Number: 1 Water Depth: 17.5 FT Penetration Depth: 28 CM Time: 11:44

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	<u>SHINY SHEEN</u> <u>SMALL SHELL FRAGS &</u> <u>WOOD DEBRIS</u>
gravel <u>SANDY SILT</u>	gray <u>pink</u>	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DPH

Project Name: Hydrocos 34Project No: 010049-11TZ Station ID: T16A-5Sampling Crew: Dan Hennessy, Dave Dickinson, Brian GormanSampling Vessel: R/V Nancy AnneSampling Method: Hydrocore 6423Subcontractor(s): Dickinson (ASS) Gorman (BET)Station Coordinates: N/Lat. 47° 16.5818' NWeather: Partly Cloudy, 65°F, SE 15-20E/W/Long. 122° 23.4726' WDatum: NAD 83 / WGS 84

Zone:

Sample Number: T16A-5Analysis: Metals / BNAc / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans(TS) / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

SVOCs

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

MWDLINE = -29' + 5.54 = -23.5' mud interval 8/19/01Grab Number: 1Water Depth: 29 ftPenetration Depth: 25 cmTime: 12:03

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

wood debris in jaws

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Recorded by: DD + DPH

Project Name: Hylebos 3/4

Project No: C10049-11 T2

Station ID: T16A-1

Sampling Crew: DAN HENNESSY, DALE DICKINSON, BENN GOSVINT

Sampling Vessel: ALVING

Sampling Method: HYDRAULIC CATCH

Subcontractor(s): DICKINSON, (MSS) GOSVINT (BCK)

Station Coordinates: N / Lat. 47° 16' 60.79" N

Weather:

E / W / Long. 122° 23' 45.72" W

Datum: NAD 83 / WGS 84

Zone:

Sample Number: T16A-1

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

MUDLINE = 40.0 + 5.1 = 34.9' mud validated 8/19/01

Grab Number: 1

Water Depth: 40.0 FT

Penetration Depth: 25 cm

Time: 12:17

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	SOME FRAGS, NOOD CHUCKS TRICE BRICKS, SUBSIS PICTES
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD+D84

Project Name: Hylebos 3/4 Project No: 010049-11TZ Station ID: AN 3113

Sampling Crew: Dan Hennessey Dale Dickinson Bryan Gordon

Sampling Vessel: R/V VANCY ANNE

Sampling Method: Hydraulic Grab

Subcontractor(s): DICKINSON (MS) CONSULTING (BEC)

Station Coordinates: N / Lat. 47° 16.4935' N

Weather: Partly Cloudy, 65°F, 10KTS

E / W / Long. 122° 23.1179 W

Datum: NAD 83 / WGS 84

Zone:

Sample Number: AN 3113

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

midline = -30.2 + 3.64 = -26.6' mms validated 8/19/01

Grab Number: 1

Water Depth: 30.2 ft

Penetration Depth: 28 cm

Time: 13:19

Bioassay / Chemistry (circle)

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Comments:

Heavy Wood Debris

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle)

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Comments:

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle)

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Comments:

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle)

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Comments:

Recorded by: DD + DPH

Project Name: Hylebos 3/4 Project No: 010049-11 T2 Station ID: AN-402

Sampling Crew: Don Hennessey, Dale Dickinson, Brian Couran
Sampling Vessel: R/V Nancy Ann Sampling Method: Hydraulic Grab
Subcontractor(s): Dickinson (MSS), Couran (BCK)
Station Coordinates: N/Lat. 47° 16.5304' N Weather: Partly Sunny 65°F 10Kts @ NW
E/W/Long. 122° 23.1422' W SD MISTY
Datum: NAD 83 WGS 84 Zone:

Sample Number: AN-402
Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans SVOCs
TS / Grain Size / TOC / TVS / Ammonia / Sulfides
(Circle Appropriate Analyses)

Field Test Results Comments: _____
Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: _____ ml Coarse: _____ ml Fines: _____
MUDLINE = 38.4 + 3.2 = 35.2' MUD Validated 8/19/01 K...

Grab Number: 1 Water Depth: 38.4 ft Penetration Depth: 28 cm Time: 13:44

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	<u>Minor small frags</u> <u>slight woody-</u> <u>debris</u>
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DPH

Project Name: Hydrocos 3/4 Project No: 010049-11TZ Station ID: AN-401Sampling Crew: Dan Hennessey, Dale Dickinson, Brian GouranSampling Vessel: R/V Nancy AnneSampling Method: Hydraulic GrabSubcontractor(s): Dickinson (MS), Gouran (BFL)Station Coordinates: N / Lat. 47° 16.5297' N

Weather: _____

E / W / Long. 122° 23.1779' WDatum: NAD 83 / WGS 84

Zone: _____

Sample Number: AN-401Analysis: Metals / BNAs / VOCs (PCBs) / Pest / Herb / TBTs / Diox-Furans(FS) Grain Size / (TOC) / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments: Muddy water, 65°F, 10KTS NW

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

NUMBERS - 39.2 + 2.84 = - 36.4' MUDS VALIDATED 8/19/01 KAWGrab Number: 1 Water Depth: 39.2Ft Penetration Depth: 25cm Time: 14:05

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments: LIGHT SHEED
WOOD DEBRIS,
FINE PLANT MATTER

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments: _____

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments: _____

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments: _____

Recorded by: DD + DPH

Project Name: Hyalecos 3/4 Project No: C10049-11 TZ Station ID: T20A-5

Sampling Crew: Dan Hennessey Dale Dickerson Brian Guran

Sampling Vessel: 142 NANCY ANN

Sampling Method: 114.00011 GWS

Subcontractor(s): DICKERSON (MSS) GURAN (BCK)

Station Coordinates: N / Lat. 47° 16.5496' N

Weather: Mostly cloudy, TCE, 10 KTS SW

E / W / Long. 122° 23.2312' W

Datum: NAD 83 WGS 84

Zone:

Sample Number: T20A-5

Analysis: Metals / BNAs / VOCs / PCBs / Pests / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

MDL = -37.1 + 2.18 = -34.4' mud validated 8/19/01 R

Grab Number: 1 Water Depth: 37.14 Penetration Depth: 23 cm Time: 14:26

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	<u>none</u> H2S
gravel	<u>gray</u>	slight Petroleum
sand C M F	black	moderate other:
<u>silt clay</u>	brown	strong
organic matter	<u>brown surface</u>	overwhelming

Comments:

SLIGHT WOOD DEBRIS, FINE PLANT MATERIAL

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none H2S
gravel	gray	slight Petroleum
sand C M F	black	moderate other:
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Recorded by: DD + DPH

Project Name: Hy 6 BOS 3/4 Project No: C10049-11 T2 Station ID: T21A-2

 Sampling Crew: Dan Hennessey, Dave Dickinson, Brian Gorman
 Sampling Vessel: R/V Nifty Andy Sampling Method: Hydraulic Grab
 Subcontractor(s): DICKINSON (PSS) GORMAN (BCK)
 Station Coordinates: N/Lat: 47° 16.5225' N Weather: Partly Cloudy 70°F, 10 knots E. NW
 E/W/Long: 122° 23.2472' W
 Datum: NAD 83 / WGS 84 Zone: _____

 Sample Number: T21A-2
 Analysis: Metals / BNAs / VOCs / PCBs Pest / Herb / TBTs / Diox-Furans SILTS
TS / Grain Size / TOC / TVS / Ammonia / Sulfides
 (Circle Appropriate Analyses)

Field Test Results

 Salinity: _____ ppt
 Ammonia: _____ mg/L
 Grain Size: _____ ml Coarse: _____ ml Fines: _____

 Comments: _____

MUDLINE = -29.8' + 2.59' = -27.2' mud validated 8/19/01 KRM

 Grab Number: 1 Water Depth: 29.8 ft Penetration Depth: 28 cm Time: 14:44

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>W/OUT debris (small size)</u>
gravel	<u>gray</u>	<u>slight</u>	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	<u>brown surface</u>	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

 Recorded by: DD + DKH

Project Name: Hylabos 3/4 Project No: 010049P11 T2 Station ID: T20A-1

Sampling Crew: Dan Hennessy, Dale Dickinson, Brian Gouran

Sampling Vessel: R/V NANCY ANN

Sampling Method: HYDRAULIC GRAB

Subcontractor(s): DICKINSON (MSS) GOURAN (GEI)

Station Coordinates: N/Lat. 47° 16.535' N

Weather: MOSTLY CLEAR, 70°F, 10KIS, NW

E/W/Long. 122° 03.2734' W

Datum: NAD 83 WGS 84

Zone:

Sample Number: T20A-1

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

SVOCS

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

MUDLINE = -31.5' + 2.5' = -29.0' MUD VALIDATED 8/19/01 K

Grab Number: 1 Water Depth: 31.5 ft Penetration Depth: 27 cm Time: 15:06

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	Woody debris on surface mixed shell fragments
gravel	gray DK	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DBH

Project Name:
Project No:
Station ID: T15A-1

 Sampling Crew: DAN HENNESSY, DALE DICKINSON, BRIAN GERRAN
 Sampling Vessel: R/V NANCY ANN Sampling Method: HYDRAULIC GRAB

 Subcontractor(s): DICKINSON (HSS) GERRAN (BTR)

 Station Coordinates: N / Lat. 47° 16.5995' N Weather: MOSTLY CLOUD, 70°F, 10KTS ON W

 E / W / Long. 122° 23.5390' W

 Datum: NAD 83 / WGS 84 Zone:

 Sample Number: T15A-1

 Analysis: (Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans) S VOCs

(TS) Grain Size / (TOC) TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

MUDLINE = -21.0 + 2.55 = -18.4' MUD UNDETECTED 8/19/01 KERR

 Grab Number: 1 Water Depth: 21 FT Penetration Depth: 25 cm Time: 15:31

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	SHALL FRAGMENTS, WHITE-MEDIUM COLORED ROCKS
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

 Recorded by: DD + DPH

Project Name: Hy6605 3/4 Project No: 010044-11 T2 Station ID: T18A-3

 Sampling Crew: DAVE HENNESSY, DALE DICKINSON, BRIAN GROOM
 Sampling Vessel: R/V NANCY ANN Sampling Method: HYDRAULIC GRAB
 Subcontractor(s): DICKINSON (MSS), GROOM (BER)
 Station Coordinates: N / Lat. 47° 16.5492' N Weather: HEAVY CLOUD, 70°F, 10 KTS E. NW
 E / W / Long. 122° 23.3499' W
 Datum: MAD 83 / WGS 84 Zone: _____

 Sample Number: T18A-3
 Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans
TS / Grain Size / DOC / TVS / Ammonia / Sulfides
 (Circle Appropriate Analyses)

SUCC
Field Test Results

Comments: _____

 Salinity: _____ ppt
 Ammonia: _____ mg/L
 Grain Size: _____ ml Coarse: _____ ml Fines: _____

PROFILE = -24.1' + 3.05 = -21.0' min. Validated 8/19/01

 Grab Number: 1 Water Depth: 24.1 ft Penetration Depth: 21 cm Time: 16:07

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u> Some woody debris
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u>
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u>
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u>
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

 Recorded by: DD + DPH



Surface Sediment Field Sample Record

Collection Date: 7/12/01
Shipping Date: 7/14/01

Project Name: Hylabos 3/4

Project No: 0100-19-11 T2

Station ID: AN-HY-14

Sampling Crew: Dan Hennessey, Dave Dickinson, Brian Gorman

Sampling Vessel: R/V Nancy Anne

Sampling Method: HYDRAULIC GRADE

Subcontractor(s): DICKINSON (MSS), GORMAN (BER)

Station Coordinates: N/Lat. 47° 16.5832' N

Weather: Mostly cloudy, 70°F, 10KTS NW

E/W/Long. 122° 23.3486' W

Datum: NAD 83 / WGS 84

Zone:

Sample Number: ANHY-14

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

SUCCO

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

MUDLINE = -34.1 + 13.57 = -30.5' MUD VALIDATED 8/19/01 KRM

Grab Number: 1

Water Depth: 34.1 ft

Penetration Depth: X

Time: 16:32

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Reject
large log

Grab Number: 2

Water Depth: 34.2 ft

Penetration Depth:

Time: 16:38

Bioassay (Chemistry) (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

SHELL FRAGS, some
weed DEBRIS

Grab Number:

Water Depth:

Penetration Depth:

Time:

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number:

Water Depth:

Penetration Depth:

Time:

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Recorded by:

DD + DPH

Project Name: 14600 3/4 Project No: 010049-11TZ Station ID: T1EA-4

 Sampling Crew: DAN HENNESSY, DAVE DICKINSON, DANNY O'BRIEN

 Sampling Vessel: RV NANCY JANE

 Sampling Method: HYDRAULIC GRAVITY

 Subcontractor(s): DICKINSON (MSS) PROJECTS, INC.

 Station Coordinates: N/Lat. 47° 16' 52.91" N

 Weather: WET, CLAY, 70°F, 104°F, NW

 E/W/Long. 122° 23' 35.13" W

 Datum: NAD 83 / WGS 84

Zone:

 Sample Number: T1EA-4

 Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans
TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results

 Comments: Taken at core station

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

WAXYLINE = -13.1 + 4.14 = -14.0' below 8/19/01 Run

 Grab Number: 1

 Water Depth: 18.1 ft

 Penetration Depth: 24 cm

 Time: 10:54

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

some cloud rocks
400 F&S
slight green in water

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

 Recorded by: DDT DPH

Project Name: Hydroco 3/4

Project No: 010049-11 T2 Station ID: AN-404

Sampling Crew: <u>DAN HENNESSY, DAVE DICKINSON, BRIAN GOURAN</u>
Sampling Vessel: <u>R/V NANCY ANNE</u> Sampling Method: <u>HYDRAULIC GRAB</u>
Subcontractor(s): <u>DICKINSON LAISS, GOURAN (BCK)</u>
Station Coordinates: N / Lat. <u>47° 16' 49.30" N</u> Weather: <u>0'cast, 60°F, LT AIRS</u>
E / W / Long. <u>122° 23.0316' W</u>
Datum: <u>NAD 83</u> WGS 84 Zone: _____

Sample Number: AN-404

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans SIVOCs

TS / Grain Size / TOP / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results	Comments:
Salinity: _____ ppt	_____
Ammonia: _____ mg/L	_____
Grain Size: _____ ml Coarse: _____ ml Fines: _____	_____

INCOINE = 39.13 + 6.17 = 45.30' Mmm. VZLCHD 8/19/01K

Grab Number: 1 Water Depth: 39.8 FT Penetration Depth: X Time: 07:54

Bioassay / Chemistry (circle)	AVS/SEM; Total Sulfides: VOC Sample (circle)
Sediment Type:	Sediment Color:
cobble	D.O.
gravel	gray
sand C M F	black
silt clay	brown
organic matter	brown surface

REJECT

Grab Number: 2 Water Depth: 39.1 FT Penetration Depth: 2.7 cm Time: 08:03

Bioassay / Chemistry (circle)	AVS/SEM; Total Sulfides: VOC Sample (circle)
Sediment Type:	Sediment Color:
cobble	D.O.
gravel	gray
sand C M F	black
silt clay	brown
organic matter	brown surface

SOFT

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle)	AVS/SEM; Total Sulfides: VOC Sample (circle)
Sediment Type:	Sediment Color:
cobble	D.O.
gravel	gray
sand C M F	black
silt clay	brown
organic matter	brown surface

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle)	AVS/SEM; Total Sulfides: VOC Sample (circle)
Sediment Type:	Sediment Color:
cobble	D.O.
gravel	gray
sand C M F	black
silt clay	brown
organic matter	brown surface

Recorded by: DPH + DD



Surface Sediment Field Sample Record

Collection Date: 7/13/01
Shipping Date: 7/14/01

Project Name: Hubbards 3/4 Project No: 00049-01 TZ Station ID: AN-405

Sampling Crew: DAN HENNESSY, Dave Dickinson, Brian Gorman

Sampling Vessel: HV DIMCOY MAR Sampling Method: HYDRA-LIC BAGS

Subcontractor(s): DICKINSON (HSS) GORMAN (BGR)

Station Coordinates: N / Lat. 47° 16.4820' N Weather: CLEAR, 60°F, ELLUMINO

E / W / Long. 122° 22.9601' W

Datum: NAD 83 WGS 84 Zone:

Sample Number: AN-405

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

Field Test Results Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____ ml Fines: _____

WINDY = -5.1' + 16.9' = -30.9' (Mud) VALIDATED 2/19/01 RAN

Grab Number: 1 Water Depth: 37.1 ft Penetration Depth: 2.7 cm Time: 08:22

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	<u>H2S</u>
gravel	<u>gray</u>	<u>slight</u>	Petroleum
sand C M F	black	moderate	other:
<u>silt clay</u> <u>soft</u>	brown	strong	
organic matter	<u>brown surface</u>	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S
gravel	gray	slight	Petroleum
sand C M F	black	moderate	other:
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by:

DD + DDH



Surface Sediment Field Sample Record

Collection Date: 7/13/01

Shipping Date: 7/14/01

Project Name:

Project No:

Station ID: AN-406

Sampling Crew: DAN HENNESSY, DANE DICKINSON, BRIAN GEEHANSampling Vessel: 17' V. NIMBLE ANCHORSampling Method: HYDRAULIC (GUTH)Subcontractor(s): DICKINSON (MSS) GEEHAN (BER)Station Coordinates: N / Lat. 47° 16' 46.20" NWeather: CAST, 60° F, LT. AIRSE / W / Long. 122° 22' 46.40" WDatum: NAD 83 / WGS 84

Zone:

Sample Number: AN-406Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-FuransTS / Grain Size / IOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

VOCs

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

INCLINE = 40.9 + 16.89 = 57.79' MINUS 2/19/01 KLMGrab Number: 1Water Depth: 40.9Penetration Depth: 24 cmTime: 08:38

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H₂S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

WILD DOG BATS w/ SHELL
SHELL FRAGS (FEW)

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H₂S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H₂S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H₂S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Recorded by:

DD + DPL



Surface Sediment Field Sample Record

Collection Date: 7/73/01
Shipping Date: 7/14/01

Project Name: Lake Mead 3/4 Project No: 0100-19-11 T2 Station ID: TZZA-2

Sampling Crew: Dan Hennessy, Dale Dickenson, Brian Gorman
Sampling Vessel: E/V Nancy Hunt Sampling Method: Hydraulic Grab
Subcontractor(s): Dickenson (MSS), Gorman (BCK)
Station Coordinates: N/Lat: 47° 16.4572' N Weather: Clear, 60°F, 4T, Wind
E/W/Long: 122° 22.4058' W
Datum: NAD83 / WGS 84 Zone:

Sample Number: TZZA-2

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans
TS / Grain Size / TOC / TVS / Ammonia / Sulfides
(Circle Appropriate Analyses)

SVOCs

Field Test Results

Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: ml Coarse: _____ ml Fines: _____

Median = $-38.5' + 4.20' = -31.3'$ mm Validated 8/19/01/K

Grab Number: 1 Water Depth: 38.5 ft Penetration Depth: 28 cm Time: 09:00

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	<u>gray</u>	<u>slight</u>
sand C M F	black	moderate
silt clay	brown	strong
organic matter	<u>brown surface</u>	overwhelming

Comments:
LIGHT GREEN ON SURFACE
SMALL WHITE WOOD
DEBRIS ON SURFACE

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: 09:20

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:
cobble	D.O.	none
gravel	gray	slight
sand C M F	black	moderate
silt clay	brown	strong
organic matter	brown surface	overwhelming

Comments:

Recorded by:

DD + DPH



Surface Sediment Field Sample Record

Collection Date: 7/13/01

Shipping Date: 7/14/01

Project Name: LLW 605 3/4Project No: 210049-11 T2 Station ID: AN-3111Sampling Crew: Dan Hennessey, Dale Dickinson, Barry GormanSampling Vessel: 1-V NANCY ANNSampling Method: HYDRAULIC GRABSubcontractor(s): Dickinson (MS), Gorman (DE)Station Coordinates: N/Lat. 47° 16.4219' NWeather: cloudy 60° LT windE/W/Long: 122° 22.6324' WDatum: NAD 83 / WGS 84

Zone:

Sample Number: AN-3111Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-FuransTS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

SUOC TPBT

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

WATERLINE = -37.5' + 7.4' = -30.1' marks validated 8/19/01Grab Number: 1Water Depth: 37.5 ftPenetration Depth: 26 cmTime: 09:20

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

grayslight

Petroleum

sand C M F

black

moderate

other:

silt/clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt/clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt/clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number: _____

Water Depth: _____

Penetration Depth: _____

Time: _____

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt/clay

brown

strong

organic matter

brown surface

overwhelming

Recorded by:

DD + DPH



Surface Sediment Field Sample Record

Collection Date: 7/13/01
Shipping Date: 7/17/01

Project Name: 1440 bars 3/4 Project No: 00049-1 TZ Station ID: AN-302

Sampling Crew: DAN HENNESSY DALE DICKINSON BRIAN GORMAN
Sampling Vessel: R/V NANCY ANNIE Sampling Method: HYDRAULIC GRABS
Subcontractor(s): DICKINSON (MCC) GORMAN (SEK)
Station Coordinates: N/Lat. 47°16.300'N Weather: C'AST, 60°F, LT. WIND
E/W/Long. 122°22.653'W
Datum: NAD 83 / WGS 84 Zone:

Sample Number: AN-302
Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans
TS / Grain Size / TOC / TVS / Ammonia / Sulfides
(Circle Appropriate Analyses)

VOCs TBT

Field Test Results

Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: _____ ml Coarse: _____ ml Fines: _____

Comments: _____

WUXLINE = 37.5' + 7.6' = 29.9' MLLW VALIDATED 8/19/01 RY

Grab Number: 1 Water Depth: 37.5 ft Penetration Depth: _____ Time: 09:47

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	Lots of Park way debris on surface some shellfish fragments
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S Petroleum other:
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S Petroleum other:
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none	H2S Petroleum other:
gravel	gray	slight	
sand C M F	black	moderate	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DPL



Surface Sediment Field Sample Record

Collection Date: 7/13/01
Shipping Date: 7/14/01Project Name: Run 3/4 Project No: C10049-11TZ Station ID: T19A-8Sampling Crew: DAN HENNESSY, DALLI DICKINSON, BRUNO COVAT
Sampling Vessel: PLV NOKY ARNE Sampling Method: HAND SAMPLE
Subcontractor(s): DICKINSON (PSS), COVAT (PSS)
Station Coordinates: N / Lat. 47° 16.5126' N Weather: _____
E / W / Long. 122° 23.2475' W
Datum: MAD 83 WGS 84 Zone: _____Sample Number: T19A-8 GPS POS. IS 6 FT EAST OF HAND
Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans SAMPLE SITE,
TS / Grain Size / TOC / TVS / Ammonia / Sulfides SUCCS
(Circle Appropriate Analyses)

Field Test Results

Salinity: _____ ppt
Ammonia: _____ mg/L
Grain Size: _____ ml Coarse: _____ ml Fines: _____

Comments: _____

Grab Number: 1 Water Depth: _____ Penetration Depth: _____ Time: 10:38

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	<u>none</u> H2S	<u>HAND SAMPLED</u> <u>ALGAL FILM ON SURFACE</u> <u>FINE PLANT FIBERS</u>
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	<u>brown</u>	strong	
organic matter	<u>brown surface</u>	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	<u>NO COMMENTS</u>
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Grab Number: _____ Water Depth: _____ Penetration Depth: _____ Time: _____

Bioassay / Chemistry (circle) AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:	Sediment Color:	Sediment Odor:	Comments:
cobble	D.O.	none H2S	
gravel	gray	slight Petroleum	
sand C M F	black	moderate other:	
silt clay	brown	strong	
organic matter	brown surface	overwhelming	

Recorded by: DD + DPL



Surface Sediment Field Sample Record

Collection Date: 7/13/01

Shipping Date: 7/14/01

Project Name: Hylabos 3/4

Project No: 0100-49-1172

Station ID: T19A-7

Sampling Crew: Dan Hennessey Dale Dickinson Brian Gush

Sampling Vessel: 12th Navy Boat

Sampling Method: HYDRAULIC (WAS)

Subcontractor(s): Dickinson (MSE), Gush (B&B)

Station Coordinates: N/Lat. 47° 16.5207 N

Weather: Partly Cloudy, 65°F, LT Wind

E/W/Long. 122° 23.2497 W

Datum: NAD 83 WGS 84

Zone:

Sample Number:

Analysis: Metals / BNAs / VOCs / PCBs / Pest / Herb / TBTs / Diox-Furans

TS / Grain Size / TOC / TVS / Ammonia / Sulfides

(Circle Appropriate Analyses)

SVOCS

Field Test Results

Comments:

Salinity: _____ ppt

Ammonia: _____ mg/L

Grain Size: _____ ml Coarse: _____

ml Fines: _____

MOULINE = -7.8' + 7.4' = -0.16' mud collected 8/19/01 K

Grab Number: 1

Water Depth: 7.84

Penetration Depth: 26 cm

Time: 10:46

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Few small frags,
very little wood
debris

Grab Number:

Water Depth:

Penetration Depth:

Time:

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number:

Water Depth:

Penetration Depth:

Time:

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Grab Number:

Water Depth:

Penetration Depth:

Time:

Bioassay / Chemistry

(circle)

AVS/SEM; Total Sulfides; VOC Sample (circle)

Sediment Type:

Sediment Color:

Sediment Odor:

Comments:

cobble

D.O.

none

H2S

gravel

gray

slight

Petroleum

sand C M F

black

moderate

other:

silt clay

brown

strong

organic matter

brown surface

overwhelming

Recorded by:

DD + DKH